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THE PHYSICAL NATURE OF THE CHILD AND HOW TO STUDY IT

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THE PHYSICAL NATURE OF THE CHILD

AND HOW TO STUDY IT

BY

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PREFACE

In so far as the teaching of to-day is superior to that of a generation ago, it owes that precedence largely to a more general observance of two fundamental principles. One of these is that action is the first law of growth; the other, that individuals vary enormously in their capabilities for different kinds of mental and physical action.

It is these two principles and the many implied by them that have called forth this book. In so far as action is to be secured from each child, the physical conditions and basis of that action should be known, not only for the average, but, according to our second principle, for *each* of the children. That conditions exist highly prejudicial to the child's physical development and, consequently, to his growth and power to act,

is evident from a glance at the ordinary schoolroom. That the causes of these obstructive circumstances are not to be stumbled upon without effort or care is equally evident. There are thousands of earnest teachers as well as parents who cannot witness the slow progress of a few children, the worn, tired faces of some, and the listless apathy of others in quiet. For such it is hoped the suggestions contained in this book may serve as a fairly complete and helpful guide to a study of the child's physical basis for action.

It is not expected that a teacher will make all the tests here suggested on every child in his room. No teacher will have time for that. But the tests may be made in a comparatively short time, and be of great helpfulness in solving some of the individual problems which present themselves to every teacher. In some cases the method of experiment admits of an application to all of the children in the room as easily as to one, and light is certain to be thrown on the power of individuals whose ability had been

previously over- or under-estimated. This light may be of avail to the teacher in leading him to a better adaptation of his work to the child, or it may lead to the removal of the cause of the abnormality, — in either case to the great advantage of both teacher and pupil. While tests of this sort increase the teacher's burden at the moment, they certainly relieve the nervous strain and worry coming upon him from the backward or troublesome pupil. If the child has become normal now that the hindrances have been removed, or if the teacher is now in a position to adapt himself to known peculiarities, — in either case the solution of the problem is complete. Work may still be involved, but not to the degree and not with the worry which otherwise would be unavoidable. Far be it from the intent of the author to hint that all the difficulties to be encountered by the teacher or parent are in the realm of the physical. The physical side of the child's nature is taken because it is get-at-able and is the source of a far larger amount of psychical deformity than is

usually admitted. Any child under question should be assumed to be weak or degenerating physically, until the investigation has falsified the assumption.

For parents whose time admits of a study of their children from the physical side, this book is intended to furnish the important data for such an investigation. It would seem that they would be among the first to interest themselves in such studies, though experience would hardly justify that opinion.

The term "practical" is always relative. Great care has been taken to include no tests which are not thoroughly practical, that is, well worth while.

The subjects treated with the tests suggested represent in part a course in child-study given by the author in the State Normal School at Mankato, Minnesota. This book was originally an attempt to supply a text-book which would make it possible to devote more of the time of that course to experimentation. Since then a change in position has led the author to see

more clearly the advantage of some such guide for teachers in a city system. A slight acquaintance with rural schools would lead one to the opinion that here first of all the suggestions of this book are needed.

An attempt has been made to exclude everything not directly helpful or suggestive in making the studies, compactness and freedom from inflation being regarded essential to the usefulness of the book. Where various methods of testing have been suggested, the practical and non-scientific is in each case recommended, though the possibilities of the situation will largely influence the choice of tests both as to number and kind.

The order of the chapters has been determined partly by their immediate importance to teachers and the relative degree of interest shown by students in the subjects treated. The last two chapters, however, have somewhat of the nature of a summary approaching the subject from the standpoint of hygiene particularly.

I wish here to acknowledge my indebtedness to Dr. J. H. James of Mankato, Minnesota, and a number of others for valuable suggestions and help, while to the criticism and coöperation of my wife the book owes a large share of whatever usefulness it may possess.

S. H. R.

New Haven, Conn.,
March, 1899.

PREFACE TO REVISED EDITION

When the first edition of this book was printed, it was hoped by the author that its usefulness might not be limited to the students in normal or training schools, for whom it was more especially intended. Its reception has proved wider than was expected; for, not only has the book served as an introductory text-book in connection with courses in child-study and observation in progressive normal and training schools, but it has been used similarly or for reference purposes in practically every university interested in the training of teachers and has guided many parents as well as teachers in their study of peculiar children. The book has also been endorsed by the most able and eminent school superintendents of the country. For example, Superintendent Maxwell only a short time ago stated publicly that he wished it might be read by every teacher in New York City.

In the present edition only minor changes have been made, although the serviceability of the bibliography has been increased by lines of comment as to the value of the books or articles specified. The author has considered the possibility of adding materially to the book, but upon reflection has decided that it contains already as much and more than the busy practical teacher can expect to make use of ordinarily. Amplification might tend to finessing at the expense of the fundamental.

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THE PHYSICAL NATURE OF THE CHILD AND HOW TO STUDY IT

CHAPTER I

INTRODUCTION

THE child is a wonderful being. From his first short cry on entering the world to the end of his period of development, he opens up for us problem after problem and enigma after enigma. How does the child regard the things which he finds about him? How many of them does he take with him into the world of his imagination? What mental processes are most characteristic and most to be relied upon in directing his growth? These questions and a host of others, not only in the direction of his mental life, but in every phase of child-life, are pressing for an answer.

Among the most interesting developments which have resulted from the recent child-study

movement is the discovery of a widespread disregard by parent, teacher, and school board of the child's physical nature. With opportunities on every side, we have not made much progress in finding out the less evident physical deficiencies of children, and have even neglected the study of the most important means of testing their physical condition. Let him who doubts this answer these questions. Are you sure every child in your class can see every portion of the blackboard distinctly? Are you sure every child holds his book at a distance which produces no strain on the eye? Are you sure that each of your children can hear everything said? Are there any partially deaf children in your class? Is the inaction or slowness of some of them due to lack of motor ability or disease? Do all take in sitting and standing the best posture possible? Do you treat all children exactly alike in the degree of precision required? Have you tried to find out the cause of pallor in this face? Has each child been taught at home the principles of hygiene most

essential for health? Do you make any allowance for different dispositions? Do you know the amount of work, mental or manual, done by each child outside of school? How much exercise does each take? Have you tried to secure the best enunciation even from those who have some slight defects in the vocal organs?

To these may be added a list of questions calling attention to the conditions which ought to exist. How far should the average child see ordinary writing on the blackboard? How near and how far from the eye should the book be held? How large must type be in order to be used by the child with perfect safety? How many square feet of floor will one square foot of window light up under average conditions? Does your schoolroom meet that requirement? How fast should children grow in each year of life? How much school work should the average child be able to accomplish at different ages without indications of fatigue? What are the most evident signs of fatigue? What form of chair and desk is most desirable? These and a

hundred others are worthy of careful consideration on our parts. Some of them doubtless can be answered by the reader, and yet in some of these cases it may be that we are not as *sure* as we think. Only this week one teacher of experience and reputation had just made the assertion that there were no deaf children under her instruction, and fifteen minutes later it was discovered that one of them was quite deaf. Hundreds of similar cases are on record. Hence the question — Are you *sure?*

The design of this book is not to give the latest results in each department of child-study touching its physical side, but to give teachers practical hints which may call attention to some physical peculiarities of children, not commonly investigated in their bearing on the work of the schools, and, it is hoped, lead to some further application of common-sense methods to our schoolroom work. The results of scientific investigations will be included, wherever they are likely to be practically suggestive or helpful.

In view of the importance — the *great* prac-

tical importance — of this physical side of child-study work, a brief comparison of our educational practice with our theory will not be amiss. We have too long regarded the child's mental power as something apart from his physical life. We have comforted ourselves with the thought of Milton and Homer when we found that our children did not see well, of Cæsar when they did not hear well, of Gray and Shelley when they were pale and sickly. Like the man who sent a huge rock crashing over the brink of a precipice, we have "hoped for the best." *Science* says that these men do not represent the *average;* that it is criminal to go on neglecting the study of conditions; that the conditioning power of the physical over the mental is all-important and demands recognition.

At this time we are to consider physical conditions only. These may be classified under two heads: first, those offered by the child as he comes to school; and secondly, these same conditions as modified or intensified by the school environment.

The normal child brings to school with him a well-developed nervous system through which he is gathering sense knowledge and asserting himself. He has a combination of habits constituting both his motor equipment for self-expression and his disposition or temperament. He has strength and health. But all this applies to the normal child. An examination of our classes is enough to convince us that we have very few normal children. In a mother's eyes the normal children are all in some family more or less remote, and the mother is almost always right. Among children there are not only varying degrees of health and strength, but even the sharpness of the senses varies. Sometimes a variation in the acuteness of the senses is found in the same child. Some children are actually deficient in one ear or in one eye without being aware of it, while quite a percentage have a defect in both, which may be a serious drawback to them in their school life. Disease has rendered others abnormal in their sensitiveness or nervousness. Adolescence brings with

it frequently a restlessness and inability to perform mental work, requiring especial tact and understanding on the part of the teacher. Accordingly, we shall use all means in our power to discover these defects and their causes. This will necessitate an examination or test of the eyes, ears, touch, taste, smell, motor ability, temperament, fatigue, record for health both past and present, blood supply, food most eaten and enjoyed, effects of adolescence on nervous system, growth in height and weight, gait, previous habits of work, posture in standing and sitting, enunciation and voice. We must also consider these, as affected by schoolroom and home conditions, and that will require a few remarks, as to the effect of certain conditions such as dryness or dampness, hot or cold draughts of air, seating, ventilation, and other important features of school hygiene.

CHAPTER II

SIGHT

Percentage of defective eyes. — One of the most important practical results which have come to light through the present widespread interest in child-study has been the discovery that our schools have been *making* weak eyes. Careful records have been made in cities of our own country and abroad, and it has been the universal testimony that the percentage of poor eyes increases from grade to grade. This means strain and headaches, unless discovered and attended to promptly. The percentages vary according to the locality and the home environment of the children. The children of the slums frequently have eyesight much impaired. A professor in a school for the blind in New York City told the writer that some of his pupils could see, although they had come there almost totally

blind. As a result of good care and hygienic conditions, they were gradually regaining some visual power. This variation both in grades and in locality makes it difficult to construct averages. About twenty per cent of the children in upper grades have some perceptible weakness of the eye which may be discovered by a careful test. This difficulty is usually myopia, or short-sightedness. Probably less than three per cent of the children have this defect upon entering school. In fact, the young child's eye is far-sighted (hypermetropic) and does not become normal before a period ranging from the fifth to the seventh year.

Causes. — The causes of defective eyesight are poor light, fine print, bad positions, *i.e.* holding the book too near to or too far from the eye, tight neckwear, rubbing the eyes, disease, cigarette smoking, and unhealthy home conditions. The effect of school work is headache and tired nervous condition making it hard for the child to attend successfully to his book or the blackboard, and a consequent unwillingness

and inability to make the attempt for any but a very limited period. The manifestations will not be constant, but will show themselves with increasing frequency as the child advances in the grades. They are effects, not causes. The "after-school headache" is another result of overtaxing the eye. It is not sufficiently noticeable at first to serve as an indication of visual defect, but its appearance is serious in its import as to the condition of the eye. Bad conditions should be discovered in time to avoid their consequences. This is particularly true of those who are suffering from congenitally weak eyes. The evidence seems to point to the fact that these especially suffer in their school work. They should be guarded by an examination as they begin their school life, and the amount of work given should be limited to what can be done without injury.

Dr. Risley says that in several cases he has known of sudden relapses of choroidal disease with an increase in refraction after the strain of a *written test* or *examination* and the prepa-

ration for the same, even where the regular work of the term had not been harmful. He also claims that too much of our school work is done at a point near the eyes. The blackboard should be used more frequently in the lower grades.

Amount and position of light. — In searching for causes of eye difficulty, it is well first of all to investigate our schoolrooms to see if there is light enough. We are told that there should be one square foot of window for each four or five square feet of floor surface; that this light should be unobstructed by other buildings or trees. It should come over the left shoulder of the child, and should be from one side of the room only. Where the light is insufficient, the blackboards should be covered by light yellow curtains when not in use. The window curtains should be raised from a roller fastened *below* the window (rather than the reverse, as is usual), in order that the light coming from above may cause less shadow and that the child may, under no circumstances, have to face the bright light. The *ideal* scheme for regulating the lighting is to

provide both methods of adjusting the shades. Parents frequently allow children to read or study at home with the bright flame of a lamp or other light glaring directly into the eye. Few eyes are strong enough to stand such abuse. Again, children are permitted to read in bed, or in positions where no proper light can be obtained. The schoolroom should be lighted by sunlight, but this condition, and possibly one or two of the others named, may be found suggestive rather of needs than of practical help. The practical lesson involved is this: Where we are per force obliged to teach in conditions not ideal, we should be all the more careful to see that every favoring condition possible be given the children, and that frequent tests be made to discover cases of visual defects which may be just developing.

Print adapted to the eye. — Our text-books have not always been guiltless in the print offered to the child's eye. If you turn to the word "Pica"[1] in Webster's dictionary, you

[1] This foot-note is printed in Pica.

will find a sample of the type which is as small as should be submitted to the eyes of young children. The letter is about seven one-hundredths of an inch in height. Most persons are somewhat surprised to learn what a large letter one of that size is. The other specimen of type illustrated in the same place in Webster is "Small Pica"[1] and is about six one-hundredths of an inch in height. According to Dr. Cohn the type used in our school-books must not be less than six one-hundredths of an inch in height, and the lines of the small *n* not less than one one-hundredth of an inch wide. The distance between *letters* should not be less than three one-hundredths of an inch, and the distance between *lines* not less than one-tenth of an inch. Test your school-books and see whether they come up to this standard or not. Paper should be non-transparent, non-bibulous, without gloss, and not embossed by type.

Straining for a nearer view. — Some children are so eager and enthusiastic in their reading

[1] This foot-note is printed in Small Pica.

that, as soon as a word troubles them, involuntarily they bring the book nearer the eye and strain for a closer view of the word in their effort to understand. This is likely to lead the child to form the bad habit of holding his book too near the eye even when no special effort is necessary. The eyes should be tested in such cases, and in the case of any other abnormal position or movement of the eyes.

Directions for quick, practical test. — This test (which should be made on every child soon after he enters school) is really a very simple matter, if these directions are followed implicitly.

Find out first whether there are any symptoms of eye trouble, as headaches, watering of the eyes, red or swollen lids, suppuration, the strained look characteristic of weak eyes, and reading with the book too close to the eye.

A child with red or inflamed eyes or lids should be required to show a certificate of the non-infectious nature of the disease, before he is admitted to school. There is considerable

danger of *infection* in the use of the same lavatories, towels, or soap, unless this precaution is taken.

At a nominal price both Snellen's Test Types and the "E" chart (for the use of children who do not "know their letters") may be obtained from the Secretary of the State Board of Education, Hartford, Conn. Hang the chart up in a good light. For a quick test of sight, adapted to young children on account of its simplicity, perhaps the best is this method of using the chart. Have the child take a seat twenty feet from the card and write down or tell you all the letters he sees at that distance with each eye. Both eyes should be open and free from squinting. The eye not in use must be covered by a card or some object held before it. Do not let the child press or touch the eye with the hand. It must be open, but be kept by a card or other obstruction from seeing the chart. If he sees all of the letters or more than is expected at that distance, the eyes are probably in good condition. If he omits some or can only see a very few of those

that should be seen at twenty feet, he is defective and should be examined by an oculist, especially if his eyes look strained and he is subject to headache. If children do not know the letters, let them draw the forms they see, or, better, use the "E" chart, having the children indicate the open side of each letter by pointing correspondingly. The Test of Vision for use in schools published by Queen [1] may be used in the same way as the Snellen for this quick test.[2]

Test of astigmatism. — On the same card are to be found the lines for testing astigmatism. Have the child, if vision is nearly normal, stand twenty feet from the card. If not normal, he should stand where he can see the type for twenty feet. Ask him whether any of the lines are "blacker" than others. Find out which they are. Are they much "blacker"? Do the rest run together into a single blur? Most persons have some astigmatic trouble, but it is not until

[1] See page 19.

[2] The Jaeger types are hardly necessary as a further test of children. All opticians keep them. Children should read No. 2 with ease at twelve inches.

some of the lines in the test are seen as a blur or headache is experienced that it is dangerous.

Care in making tests. — Care should be taken that our tests be as accurate as possible and free from vitiating conditions. The blunders made even by bright teachers in these tests are astonishing. Experience has shown five directions to be especially necessary. *Hang the card in a good light. Keep it clean,* free from lead-pencil or finger marks. *Test one eye at a time. See that the other eye is properly covered. Keep the card out of sight when not in use.*

A more accurate test. — Although the above tests are likely to detect all cases which it is possible for the teacher to discover, it is frequently desired by teachers or parents to take more than ordinary precautions to get an accurate test, particularly where records extending over a considerable period of the child's life are to be kept, or where scientific results are required. Its advantages over the other test are summed up in the facts, first, that the poorer eye, being discovered usually at the first

distance, is not helped at the other distances by the impressions left when the better eye was used; secondly, that more letters are offered for the test; and thirdly, that inaccuracies in the types or in their use are more readily detected. In using Snellen's test card begin not less than sixty feet from the card, test the child's ability to read with each eye the type for that distance, as before, cutting off the vision of the eye not in use with a card or other obstruction held in front of it. Then advance to the next distance indicated on the card and try each eye at that point, and so on. By waiting a moment between the tests for the two eyes the letters will be forgotten, and you will soon find out which eye sees better. If not certain, at the next distance begin with the eye tested second at the other distance. After that always test the poorer eye first. Do not hurry the child, and, if he tires, give him time to rest before you finish. If he can name none of the letters at the required distances, find out what he can see; but usually the eye which does not distinguish most of the

letters at the required distances (if the light is good and the card clean) should be examined by a physician. This is a test of keen-sightedness. If the eye does not see well, it may be troubled with myopia (near-sightedness) or hypermetropia (far-sightedness) or astigmatism. The use of plus or minus lenses has been advocated to determine the nature of the disease, but if the eye has been found defective, further investigation can be left to the oculist.

Use of Queen's test card. — If you wish to verify your results by another test, or to compare methods, send for the "Test of Vision for Use in Schools" prepared by James W. Queen, 1010 Chestnut Street, Philadelphia. The cost of this is twenty-five cents. The directions, which are very clear, will be found on the back of the card. This card has the advantage of offering a test of accommodativeness. Where the fine print of this can be seen beyond the normal, the presumption is that the child is far-sighted; if seen nearer than the normal, it is to be presumed that the child is near-sighted, though his

accommodative power may sometimes falsify this conclusion. Being small, the card can be turned about readily, and in the astigmatism test, the consistency with which the child chooses can be tried.

Test for color-blindness. — Although of less frequency, cases of color-blindness do occasionally explain the apparent stupidity of some children before our maps. The percentage is, however, small; among men, less than four per cent, and among women, less than one tenth of one per cent being affected. Therefore the test is of less practical interest. In order to discover color-blindness in children, colored paper or worsteds of some half-dozen tints or shades of each color are needed. "Holmgren" sets especially prepared for the purpose may be obtained of E. B. Meyrowitz, Incorporated, New York City. They should be kept carefully, and renewed occasionally, if the colors are dimmed by handling. Take the children one at a time. Select from the set a light green. To a color-blind person some other colors may appear only as lighter or darker shades of this one. Be

especially careful not to name the color, as in that case the experiment would be likely to be vitiated. Ask the child to pick out all the objects which are similar in color to the sample though of a lighter or darker shade. Try the same test with the rose color and the pure red. Children who make evident mistakes are probably color-blind.

Color-blindness is sometimes caused by excessive use of tobacco especially if combined with the use of alcoholic liquors. The disease as found in the schools being inherited is incurable, and allowance must be made in the classroom for the defect. No amount of training in color-perception is likely to help it. The comparatively small number of women affected by the disease is an unexplained fact of heredity and seems to have some connection with sex.

Reflection from blackboard. — In most schoolrooms there are some seats from which a part of the blackboard cannot be seen. Do you know which they are in your room? Test the accuracy of your knowledge in this way. Divide

off all the blackboard space into sections of four or five feet, labeling them as you do so A, B, C, D, etc. Then make a map including each seat in the room, and go from seat to seat, surveying all the blackboard space from each. At each seat, enter on your map the letters for the sections of the blackboard not clearly seen. Be careful to place your head no higher than the child's as he sits at his desk. See what effect certain common positions of the curtain have. If a child cannot see writing on the board from a distance at which you can see readily, test his eyes.

CHAPTER III

HEARING

Need of tests. — To the teacher who is certain that all his children hear well, child-study has some interesting data to offer. In the first place it has been found that out of several thousand school children investigated nineteen per cent or, according to other results, twenty-five per cent, are somewhat deaf in one ear or both. That means one out of every four or five in your class or mine. In a given class of fifty children at least eight or ten are probably suffering from some defect in hearing.

Difficulty of detecting cases without actual tests. — One of the worst features about this difficulty is the fact that the child does not know that he is suffering. He thinks his hearing is as good as the average. He can hear the teacher's voice if he tries, but it is too hard

work. So he relapses in sheer self-defense into a half-comatose state. His name is more easily heard than other things, and, whenever anything resembling it is said, he straightens up, listens carefully, while the teacher repeats the question, makes his reply, and then relapses again. We have all been at some lecture on an occasion when our seats were just out of easy range of the speaker's voice. We listened attentively for fifteen minutes, perhaps less, and found ourselves conscious of making a decided effort. If it were interesting enough, we kept on listening for another half-hour. At the end of that time we were much fatigued. We leaned back and rested, possibly again bending forward as we saw some striking gesture, or as some word louder than the rest excited our curiosity. But at other times we were in a sad state of relapse, a perfect counterpart of the dreamy state, in which the deaf child finds himself, even though by straining he may be able to hear a little. It is this that deceives the teacher and leads him to the conclusion that the child hears when

he does not. Numbers of confessions are on record already — and the list is growing — of instances in which teachers have found children to be quite deaf who had not even been suspected.

Possibility of cure. — It is an interesting and suggestive fact that of these cases of deafness less than ten per cent are incurable. A very short time is required for the removal of the adenoid growths which, though behind the nostrils, are a frequent cause of deafness in children. If one ear only is affected, you will be able to place the child where he can use his good ear to the best advantage.

Causes. — The causes of defective hearing are, first, such infectious diseases as scarlet fever, measles, etc., which cause discharges, producing a stoppage of the middle ear, and frequently continuing long after the patient has recovered from the disease itself; secondly, such diseases as nasal catarrh, adenoid growths, and enlarged tonsils, which produce a complete or partial stoppage of the Eustachian tubes which furnish the middle ear with air; and thirdly, blows, div-

ing, and extremely loud noises, such as are frequently made by children yelling into one another's ears.

Symptoms. — The result of such defects on the school life is a dreaminess or inattention, a dullness or stupidity (which may entirely disappear when the child is cured), and a tardy execution of commands, since the clew must be obtained through the movements of others. In many children the degree of the difficulty varies at different times. In some it is accompanied by catarrh and a tendency to sit with mouth open. This habit with the dullness or stupidity of the face intensifies the impression and is perhaps a surer symptom of imperfect hearing than either slowness or dreaminess. Find out also whether there has been any pain in the ear or any running of the ear. Scarlet fever and measles are so frequently followed by disease of the ear that they may be counted among the symptoms of auditory defect.

The three methods of testing the ear. — There are three methods of testing the ear: first, by

the whisper; secondly, by the acoumeter; and thirdly, by using the ticking of a watch. It is difficult to keep the whisper at the same degree of loudness, unless it is made just after a long breath has been taken and exhaled until the lungs have made their normal expiratory effort. The acoumeter is good, and consists simply of an apparatus arranged to tap gently on a metal bar.[1] Most schools are not equipped with this, however. The watch can always be obtained, and is very reliable, especially if the "test whisper" is used to correct our results.

Scientific test with the watch. — If scientific tests are to be made, or a series of tests extending over a number of years, the method is much complicated. The course of procedure for the watch test is as follows. Great care must be taken to see that the room is *perfectly* quiet. Any clock in the room must be stopped. All noises, even though distant and faint, must be stilled. If the noise is beyond our control and continuous, our scientific test will have to be abandoned for a more favorable time and place.

[1] Politzer's.

Having absolute quiet, blindfold the subject so that he will judge from the sense of hearing alone. Cover one ear and have him turn his head so that the other will be in a favorable position for receiving the sound. Starting at a distance at which the watch cannot be heard, gradually approach, asking occasionally if he can hear. Take the watch in some way convenient to yourself, and always when testing hold it in the same position. When you move, take care too that you do not ask the child to listen, until you have gained the new position desired. Move *toward* him, testing at intervals of a foot, until you reach a spot where he is quite certain he hears the ticking. Then move away from him again, and find out how far back he can still distinguish the sound of the watch. If very far behind the place where he first heard the ticking, take the watch a little out of range and try again as before. If the sound is noticed at about the same point as before, measure the distance from that point to the child's ear. If not, continue in the same way, until

some nearly uniform results have been gained. The time to listen may be indicated by the word "now." If some such signal is not given, the constant listening produces fatigue and inconsistent results. The memory of the sound is sometimes a disturbing element, and you may be obliged to suspend the trial for a few minutes. On more than one occasion a boy has told me, and honestly, that he heard the watch when it was beyond hearing distance, and in my pocket. It is frequently desirable to muffle the watch when near the limits of the child's hearing range, rather than change your position, as children frequently judge that they ought to hear the watch, and therefore that they do from the sound of your feet or dress as you move, from the proximity of your voice, or from their knowledge that you are near. Having tested one ear, proceed with the other in the same way.

Watches vary greatly in the distances that they can be heard. The writer has seen some that could hardly be heard three feet. Printed statements make the difference from two to

thirty feet. To find out the degree of the child's hearing, each watch must be tested until its average distance is discovered. Four such trials under like conditions, if the results are about the same, will be sufficient for determining approximately the normal.

The methods of using the acoumeter and the watch are practically the same.

Whisper test. — The "test whisper" should be used to correct possible errors in the test made either by the watch or acoumeter. Some ears defective for certain sounds respond readily to vocal utterance, while others, satisfactory as far as the watch test is concerned, are found deficient through the whisper test. In fact, the letters are discovered to have different sound values, and so it is best in using the whisper test to combine them into words, making such numerals as fifty-three, forty-seven, sixty-nine, etc. The whisper must be uniform, and must be given always with the same force. To make the "test whisper," draw in a deep breath, make just a normal expiration, at the close of which

the whisper should be made. This will be nearly uniform, and can be heard on the average in a perfectly quiet room nearly sixty feet, but the normal distance for different voices varies greatly.[1]

Tuning-fork test. — If the ears are found defective, sound a tuning-fork and place before the bowl of the ear so as to give the best opportunity for catching the air vibrations. Then sound the tuning-fork again, and place its head on the bone back of the ear. If heard louder when placed on the bone, the bone-conduction is better. If the reverse, the air-conduction is the better, which is the case in the normal ear. Poor air-conduction indicates a stoppage of the ear, which may be removed and restore the hearing.

The record. — Records should be kept under the following heads: —

Name (sex).
Age.
Apparent symptoms.
Distance at which right ear hears watch.
Distance at which left ear hears watch.
Distance at which right ear hears voice.

[1] For normal distance under average conditions see page 33.

Distance at which left ear hears voice.
Tuning-fork heard best by air or bone conduction — right ear.
Tuning-fork heard best by air or bone conduction — left ear.
Normal for watch used.
Normal for voice used.
Degree of quiet secured.

A less scientific but more practical test. — The preceding mode of investigation has some scientific value. A simple practical test can be made in about one-tenth of the time necessary for the above, and be just as useful as far as determining whether a child has normal hearing or not. The great saving of time is made by not trying to secure perfect quiet. In a room just moderately still, with the clock ticking and persons moving quietly about or whispering softly to each other, both the watch test and the voice test can be made with sufficient accuracy for all practical purposes, but the method of procedure must be a little different. Place the child on one side of the room, facing the wall. Have him close one ear as before and shut his eyes. Take a position a little to the side of

the ear to be tested, and by a slow arm movement bring the watch, from a position five or six feet to one side, toward the ear. The child is to tell you as soon as he hears the ticking. If any special noise arises, wait until the distracting sound has ceased. Try until the results are consistent. My watch, which can be heard eight feet in a very quiet room, has a normal of about forty inches in our school library, when the students are using it. My voice in the "test whisper" under the same conditions can be heard about forty feet normally. Any difficulties arising in this practical test must be met in the same way as in the more scientific one. But it is surprising how satisfactory the results are, even though the conditions in the room seem to vary somewhat. The distance can be located within limits of one or two inches for the watch, and one or two feet for the voice. Of course we should know about the normal both of our voices and our watches for the conditions under which the test is made. This method has been indorsed by experienced ear-specialists.

Significance of tests. — Children will be found who can hear at only half the normal distance. We are not to understand from this that the hearing is half gone, but it does indicate that the child cannot hear as readily and distinctly as the average, and that he should have the best seat possible. Most of the deafness discovered is that in which one ear only is affected, and consequently a seat favorable to the good ear is desirable. As over ninety per cent of the cases can be cured, the parents should be urged to have the child examined by a physician.

Tests of tone, timbre, and harmony. — The accuracy with which children can distinguish tone, timbre, and harmony has not been made a test for grading pupils with regard to their musical ability, and as a rule the teacher has trusted that the defectives would be discovered incidentally. Those found were then removed from the class as absolutely incapable or suffered to go on, with the caution not to sing at all if they could not do better. Child-study demands, however, a search for these exceptions

and special treatment, until they may be brought to something like a normal appreciation of timbre, tone, and harmony. That they may be greatly developed is the testimony of most thoughtful teachers. Test the power of distinguishing tones by asking the child to reproduce notes given either by voice or instrument. The defect is not in the voice, as is shown by the fact that tones not made when called for are hit upon in the child's attempt to reproduce others. The association between the sound made and the appropriate muscular movement is lacking, just as even in most good musicians *absolute pitch* or the association between a given note and its exact sound equivalent is lacking. The child's appreciation of harmony may be learned by asking him to select the chords he likes from those he dislikes as you strike them on the piano or organ. Test his discernment of timbre by striking with your knife or pencil different woods, metals, and other substances. Does the child recognize the sounds peculiar to each?

CHAPTER IV

TOUCH

Increased power of discrimination possible. — While there are no remarkable statistics or records of children whose school life has been changed from despair to brightness and success by the discovery and cure of some difficulty in the sense of touch, it is known to most of us that there are marked differences in the ability of different individuals in this direction. The examples of astonishing power of discrimination for the sense of touch are evidenced by most blind persons and are familiar to us all. We have no reason to believe that this power could not be developed in any child, if occasion demanded, but this training is, of course, unnecessary.

The tests. — The tests are of less practical

value since our school work draws on that sense to so slight a degree. For the best results in natural science, however, some ability in this direction is desirable. If a child is suspected of being below the average, he may be easily tested by having him distinguish between the degrees of roughness or smoothness of different kinds of cloth, of wood, iron, leather, etc. It may be made a game in which the whole class participate. Of course the eyes must be blinded in making the test.

TASTE

Use of test. — The sense of taste, like touch, is not levied upon seriously by the teacher in his class-room demands. That it is capable of much development is shown by tea-tasters, who can distinguish the slightest differences in quality. As a practical test little can be said for the general investigation of the sense of taste. It is a matter of interest, however, and will lead the children to a more general appreciation of the facts, first, that they vary in their power to taste,

and secondly, that their ability to distinguish differences can be increased by practice.

Method of testing. — For the test dissolve or place in separate glasses of water a very small amount of sugar, salt, vinegar, tannin, or quinine. Some persons can detect one part of quinine to one hundred thousand of water. Have the children tell which of the solutions is sweet, salty, sour, or bitter, by taking just a spoonful of each. Be careful to have your solution very weak. Make it so that you can only just distinguish the taste of each. Take care to rinse the spoon in fresh water after each trial, and give the child at least two minutes between trials. Stir the solution each time.

Another mode of testing consists in mixing salt, sugar, and spices of various kinds that are known to the children, and asking them to tell what they can taste in the mixture.

SMELL

Development possible. — A notable instance of remarkable development of ability to discrimi-

nate odors is given in the following. Dr. Howe, in the Forty-third Report of the Massachusetts Asylum for the Blind, is authority for the statement that Julia Brace, a *blind* and *deaf mute*, could instantly recognize a person she had met before as soon as she caught the odor from his glove or hand. She was actually employed to sort all the clothes of pupils in the institution, after they came from the wash. It is said that the changes of our northern climate tend to dull the acuteness of the sense of smell. Men do not detect odors as readily as women, and are therefore less likely to notice foul air in the schoolroom.

Tests for smell. — Tests for smell can be made by using diluted perfumery, seasonings, etc., as in testing taste, and asking the child to tell the one from the other by the sense of smell alone. Care must be taken that the odor does not disappear before you are through with the test or game. This test lacks the importance from the standpoint of practicality which belongs to most of the others.

MUSCULAR SENSE

In schools where manual training has already made its appearance or where drawing is taught, it is important that a study be made of the child's ability to measure distance by the sensation of the muscular movement. At present, however, it may be best to test rather by watching the ordinary work of the child and then determining whether the error was due to inability of muscular sense, inability to discriminate with the eye, or carelessness and lack of interest. Ask the child to close his eyes and draw a line just the length of one you have shown him. Have him open his eyes. Can he now tell which is longer? If so, the eye gets the length quite accurately, but the muscles are at fault in their cue. Find out the normal error for each length used.

TEMPERATURE SENSE

Test the temperature sense by having the children pass to the part of the room in which the thermometer is hung with face toward the

wall, and tell by their feeling whether it is seventy degrees, above seventy, or below seventy. If above or below, how many degrees? How many can tell by moistening the finger the direction of the wind?

CHAPTER V

MOTOR ABILITY

Importance for self-activity. — Modern method is insisting on the necessity of self-activity on the part of the child, as *the* essential to its development. Though this self-activity implies inner life and not alone external activity or motor power, its most decided and satisfactory evidences are found in actual self-expression through the child's motor ability. This is particularly true of children in the lower grades, and the teacher who fails to recognize this fact in practice, if not in theory, is not living up to the light of his generation. According to some authorities on education, less than a fourth of the young child's school time should be spent at his seat. All the rest of his work must bring in his motor activities. As conservatives we may, perhaps, desire that a somewhat larger

part of the self-activity of the child find its expression in emotion and inner mental activity rather than in actual bodily movement. We have already erred, however, by repressing expression, and will without doubt have to make a large concession to this newer demand. Emotion which spends itself in a mere play of feeling without leading to action will tend to occupy a less and less prominent position as the importance of self-activity and, therefore, of motor activity, receives more and more its due.

Importance for ideas. — Our ideas of moving objects, of form, of position, time, and distance are largely gained through the sensations accompanying slight movements of the muscles. If a child is lacking in power to make the necessary movements with accuracy, his motor ideas will be faulty. Some children seem to think quite largely in motor ideas, though it is much to be doubted if we have motor images to a great degree unless our experience with the object has usually been of the motor kind.

Importance of overcoming defects. — But not

only must the motor ability of the child be known in order to use his self-activity for effective training, but the lack of capacity for controlled movement indicates sometimes disease, usually the need of development, and always the necessity for especial direction and encouragement by teacher and parent to counteract the effect of unsympathetic criticism by playmates. The boy who moves slowly and handles himself clumsily is the object of ridicule among his playmates, who nickname him "wooden man" or some equally significant term. He does not get encouragement from them to overcome his fault by extra work and training. His stimulus in that direction must come through his teacher. If in his school life too he becomes the butt of ridicule, what wonder if he does become apathetic, still less active, and the more *shut up within himself, i.e.* the less expressive of his real self. As Dr. Beebe says: "Young children when awake are eternally and everlastingly busy. Throughout the ages mothers and doctors have been, and to-day are, promptly suspicious of a child

who mopes or is not doing something. Very often the indication of oncoming disease is a checking of these motor activities. . . . Have you not been told with a sort of suppressed pride of the number of pair of shoes Willie uses up, and of the socks, trousers, and hats that suffer shipwreck? All to the effect that the sprightly boy or girl while ruining his father financially, is just a little the smartest and brightest child in the block."

Causes. — The causes of defective motor ability are disease, uncleanliness, lack of hygienic conditions at home (as insufficient food or sleep), fatigue, and too much repression. Of course some children are naturally slower than others, but that does not mean much slower, unless the cerebellum of the child be affected in some way by deformity or disease. One published case of supposed defective motor ability was found to be due to defective sight. The cure is in each case removal of adverse conditions, and encouragement to make continuous effort to improve through practice. Even in cases

where the cerebellum is affected, it seems to be possible for other centers to do the work in part at least, as instanced by the French girl who without any cerebellum learned, though late, both to walk and talk.

Practicality of tests. — The preceding introduction seems at present necessary for a real appreciation of the practical value of tests as to motor ability. If we are to call upon the children for action, we must know more definitely what a child's natural ability is, how quickly, how accurately, how gracefully or gently, we can rightfully expect each child to move. There is a great difference in children. We may be inflicting the same injustice and discouragement upon a child by requiring too fine work of him in writing, that we would by blaming a deaf child because he did not understand our questions. We want the best of which each child is capable, and therefore not the same from all the children.

Directions for tests made through play. — As the first and most important test of motor ability and tendency to bodily activity, I know of noth-

ing so instructive as a few days' careful observation of the children at their play before school, after school, or at recess. There you find the *real* child, and not what he would gladly seem. Jot down in a note-book the relative power to act of each child with reference to (1) his tendency or readiness to act; (2) his quickness of movement; (3) his accuracy; (4) his force or weakness; (5) his gracefulness or awkwardness; (6) his gentleness and ability to modify or adapt his expenditure of force to the amount of energy required for the movement; (7) persistence in action. Try to judge solely from the data the children present in their play upon this particular occasion, and eliminate all previous estimates as to their characteristics. Note not only the motor qualities of the children as they appear, but also the incidents on which you base your judgment of them. There is no greater evidence of tendency to self-expression through the motor activities than play. Miss Sisson, in an interesting paper[1] on "Children's Plays," clas-

[1] "Studies in Education," V.

sifies the children she observed according to the character of their games. A most significant feature of her study for motor ability was the fact that all the plays carried with them movement; but more important than that was the fact, that one of the divisions of her classification consisted of children who did not *play* very much, but found their amusement "in running from one part of the yard to another because of some passing whim, — over to the faucet to get a drink, or over to the sand pile to see what the others were doing." "The general quality of the plays that held and attracted the children was action." If the child does not play, the teacher's business is to find out his mode of recreation and its value, both in building up physical health and in stimulating the child to self-expression.

Tests for quickness of reaction. — These observations made from play need to be supplemented by some more exact and uniform tests. Arrange the children in groups of not more than five. In order that all may be seen at

once, take a position a few paces off. Then have them, at a given signal, extend the arm, or make some other uniform full-arm movement as quickly as possible. Try it two or three times and notice the children who always fall behind. If you choose, try the quickest and the slowest of your different groups together. In the same way we may test the quickness of an arm or a leg movement, and make it a game which will be entered upon with great interest. Are your results the same in all the trials? Have the children line up ready for a race. Who starts first; who last at the signal? See who can make on paper the most crosses following the left margin in five seconds. Have them begin with the cross at the top of the paper and make a line across the page. Then repeat the operation, beginning with the next, and so on. See how many lines each can draw in five seconds. How many in ten. Who draw the most. Who the least. A tapping with the lead pencil on a sheet of paper in different places will test both wrist and finger muscles.

See how many dots can be made in ten seconds. To investigate the swiftness of the fingers by themselves, have the children make, by finger movements, as many vertical or nearly vertical lines as possible in ten seconds. The fingers vary widely according to the age and the nervous make-up of the individuals. The average record made by twenty-five teachers under almost precisely similar conditions was: For the crosses $11\frac{11}{24}$ in 5 seconds; for the horizontal line, $20\frac{7}{8}$ in 7 seconds; for the tapping, $41\frac{1}{6}$ in 5 seconds, and for the vertical lines (counting each up-and-down stroke as one), $57\frac{5}{12}$ in 5 seconds.

Games with lessons for teachers. — All these tests and many others similar to them may be made a game for the children, in which they are sure to be interested and to do their best. To the teacher it is quite likely to furnish some data which may show the point of difficulty in some child whose inaction, blundering, or awkwardness has been regarded by him and perhaps by the parents as pure stupidity or listlessness and punished accordingly, when, as a

matter of fact, it was a case of defective motor ability needing especial encouragement and incentive to effort.

Significance of tests for physical culture. — Our schemes of physical culture as carried on in the schools would all be a little less systematic or uniform and adapt themselves more to the motor possibilities of individual children, if they had caught somewhat more of the light thrown on the children's motor powers by these tests. The systems may fit averages, but teachers should work with individual children and learn their characteristics. Quickness, grace, and precision are widely different things for different children. We want the best of which each child is capable, whether dull and slow or quick and bright.

CHAPTER VI

ENUNCIATION

Conditioned by certain forms of motor activity and habit. — Although a form of motor activity, enunciation has seemed important enough to deserve a place by itself. Not many cases of greatly arrested speech development are found in the schools, perhaps for the reason that we will not allow them there, but commonly cases of indistinct and childish enunciation do exist, which ought to be broken early in life, before bad habits both of ear and speech are formed. These are frequently the result of imitating the baby talk of fond parents, who do not realize that their repetition of the child's first feeble effort to pronounce a word is simply taking away from him the possibility of improving his first attempt. Distinct, clear language is all the more necessary if the child's ability to imitate

correctly is limited. At school he should be encouraged to improve as much as possible, since he already has some habits of speech and associations of sounds, which should be overcome.

Children of foreign parentage. — The difficulty is increased, however, in the case of children of foreign parentage, where English is not heard to any great extent at home, and some of the sounds of English are at apparent variance with the vocal possibilities of the children. Here all depends on the patience and child-study of the early teacher of the children. It has long been proved by countless cases that children taken early enough to a foreign country have no difficulty in mastering the details of pronunciation and accent so perfectly as to be practically indistinguishable from the habitants whose ancestry has been in that country from time immemorial. To acquire desirable habits of pronunciation soon enough is then the problem. Its solution is to be found only in the study of the child early in his school life. Any sounds that cannot be made must be tried again and

again, until in some word or some connection they are brought out. If to the three or four years of his life before school three or four more are added before any attempt is made to find out just what his difficulties are, he will never be able to speak his own tongue as he should.

Deformity or disease of organs or centers of speech. — The most difficult cases to deal with are those in which there is some deformity or disease of the cerebellum or other centers either of correlation or of speech. The consequence is loss of the power of speech ranging from the most serious cases to those where only certain sounds and combinations are found difficult. Even in such cases, however, child-study offers a clew, and important results are attained with some patience. An instance [1] is on record, in which a boy, — whose motor activities at the age of twenty months were terribly crippled by a fever, — starting when eleven years old with

[1] A case of "Arrested Speech Development," by H. H. Scurlock, *Child-Study Monthly*, Vol. II, No. 11.

only five words, by careful work acquired in five or six months a vocabulary of over three hundred. It is only through the study of the child's actual accomplishment and power in the use of his vocal organs that such results are gained. First, the basis is obtained; then, by experimentation this beginning is widened out, corrected, and made habitual.

Directions for tests. — In all these cases our chief fault in the schoolroom has existed in our confidence of our ability to notice errors and correct them in the class-room. The child to be examined must be taken by himself and asked to pronounce after the examiner a list of words containing almost all the common sounds and combinations of them. Wherever errors are found, they must be noted, and then, as soon as the list is finished, a systematic attempt must be made to lead the child to the correct pronunciation. The following list is recommended. Some words apparently unnecessary have been added as they have from time to time shown themselves desirable.

cat	run	pig	bed	milk	hop
jump	have	chin	this	shall	awl
sing	see	walk	tax	buzz	book
me	out	call	yes	large	pure
fur	eat	whip	love	funny	kite
put	food	bar	boy	is	fall
on	new	make	lie	grass	oil
girl	sail	quick	her	warm	rope
hitch	place	pleasure	my	thank	boat
say	move	face	and	fun	arctic

Principles involved in improvement of enunciation. — Having chosen the words which are not pronounced correctly after a trial or two, we must rely upon two principles to help us in securing the correct pronunciation. The first of these is that the instinct of imitation enters into the child's whole life very powerfully. The second is the principle that practice increases motor power and control.

Getting an apperceptive basis for a sound. — Some sounds can be heard and attempted for a number of days before they are perfected, but great help is gained if you can find another word containing the same sound this time correctly pronounced by the child. For example,

in one case a child could not pronounce the word *bar*. Every word with this combination thought of was tried, but all to no avail. In every case the *ar* was pronounced like *or* or *awr*. Finally it was remembered that the child had been studying about Alabama. This the writer pronounced as though spelled Alab*ar'*ma, as it had been thus pronounced in the classroom by the teacher. The child then by her power of imitation reproduced the sound correctly, and from that she got *bar*, *car*, *far*, etc. Before the list was finished, however, the old habits prevailed over the new, and it was necessary to go back to *Alabama* and start over. She finally succeeded very well. The word *pleasure* was difficult for her, being pronounced *pezzuh*. *Please* was then tried, but it was always *peas*. She was therefore led to say *leas* until the *l* was surely pronounced, and then given the sound of *p* followed by the word *leas*. When asked to speak the whole word quickly, she pronounced it just as well as anybody could, and continued to do so. But for

eleven years the child had been allowed to say *peas.*

Time and care necessary. — A little time for the development of the vocal motor organs and a little patience and ingenuity will overcome most cases. There are few fields where the same amount of work will produce more remarkable results than in this of enunciation. Some care must be taken not to make the child self-conscious. The self-consciousness produced by the knowledge that his pronunciation is faulty or childish leads to a lack of freedom of expression and to a dependence, which are frequently very disastrous.

Stammering and stuttering. — The speech defects just treated are of the more common and less serious type. About one child in a hundred is, however, a stammerer or stutterer, as a result either of nervous disease or of bad habits in the use of the muscles fundamental to speech. The schools and the early speech training at home have been blamed for producing these defects. Whether or not the censure is de-

served, it is true that with proper care and watching they might be almost eradicated.

The respiratory, the throat, and the articulatory muscle-series must act together in various combinations. If these separate and complicated sets of muscles are not touched off in proper sequence and with the right intensity confusion results, false sounds or no sounds are uttered, and the result is stuttering. If through disability, mental or physical, either the whole series, or one set of muscles, or part of a set is not innervated in the motor discharge, a hesitation or partial vocal expression ensues which is called stammering. This may occur only rarely and in connection with difficult phrases only; as, for example, in "it sufficeth us." A person would hardly be called a stutterer or a stammerer unless the defect had become more or less habitual.

Suggestions for overcoming the habit. — Cases of stammering, in so far as they can be separated from their hereditary or nervous connections, are due to bad methods of speech training

and lack of sufficient practice in correct pronunciation. The remedy is, therefore, greater care, both at home and at school, to secure this practice. And this endeavor may well be furthered by toning the nervous system through active gymnastic exercise and by proper regard, on the part of the teacher, for the laws of speech development.

In cases of stuttering we have a perversion of the nervous discharge producing muscular spasm. In so far as this habit can be disentangled from the nervous disorders of disease or inheritance, it is due to bad habits of breathing or enunciating and a confusion of mind, which react on the nervous system. Relative to the importance of proper breathing, Dr. Hartwell says: "Though any one or all of the series of organs concerned in producing speech may be affected in one who stutters, the respiratory muscles are almost certain to be at fault." He states that, as a rule, those most successful in the treatment of stuttering "begin their efforts with gymnastic exercise of the breathing muscles,

and later on direct their attention to developing normal habits of action, first in the muscles of phonation, and then in those of articulation." The method of procedure is therefore from the fundamental to the accessory. It is necessary, however, not merely to develop their respiratory muscles but to create the habit of always speaking with the chest well filled.

To counteract this confusion or state of flutter which is peculiar to the nervous side of this difficulty, encourage the child to wait until he is ready. Reduce his self-consciousness by doing nothing to embarrass him and by leading him, when practicing by himself, to make some slight muscular movement with his finger and hand whenever he feels that he is losing his control. Not infrequently the cure is comparatively simple.

CHAPTER VII

NERVOUSNESS

Causes. — All of our schools have their quota of nervous children; some of them irritable, some of them excitable, all of them restless and impatient of the teacher's next move. The causes are almost too numerous to warrant an attempt to mention them. Some of the most important are insufficient or unsuitable food and irregular times for eating it, use of tobacco, lack of sleep, fatigue, most forms of disease, heredity, bad air in schoolroom, difficulty with school work, shocks, nervousness in the manner of the teacher, unhygienic conditions of home, school, or person, adolescence, and so forth. The removal of the unfavorable conditions will greatly improve the situation, but not infrequently a physician will have to be consulted, before the real cause will appear.

When nervousness should alarm the teacher. — If the child is naturally nervous and does not become more so, we need not be alarmed, but must rather adapt our methods to the condition of the child. If a child is growing more nervous than he was previously, we should study him and perhaps consult with the parents about his home life.

Need of tests. — Nervous children conspicuous to visitors in a schoolroom are frequently unobserved by the teacher, who has had an opportunity to become accustomed to them. Teachers are much readier after your test to agree with you in your selection of the nervous children in their classes than to pick them out beforehand. My belief is that teachers usually center on certain ones as the nervous children of the class and certain others as absolutely free from any such defect. Those in between are not classified. To include all and also to act as a proof of the accuracy of our observation (*not* to supplant it), we should test the children in some uniform way.

Directions for tests. — The best test I know is the command to the children soon after the opening of the session to rise and stretch out their arms and hands, with palms down, horizontally in the same plane as the body. Illustrate by doing it yourself. Have them remain in this position a moment. Notice the quivering and twitching fingers, the sagging thumbs, the drooping arms, and you have an indication as to the nervous children of your class, though there may be some few whom you have not discovered. These will not be the very nervous ones, however, but those who have control and energy enough to nerve themselves up to the task at hand. It would seem unnecessary to state that the children should not know why the test is made, nor what is to be striven for. Without comment they are to do as the teacher does, the record is taken, and work resumed. For another test ask them to do the same as before, but this time with eyes closed. A swaying motion of the body may ensue without the knowledge of the child. In extreme

cases the child might fall, unless told to open his eyes.

For chorea. — For a test of chorea, a most common nervous disorder among school children, the preceding test may be supplemented by the following: Ask the child to raise his hands in front of him as high as his head, with palms toward you. Are the hands and arms symmetrical or evenly balanced? Are they free from trembling or twitching? If not, signs of marked nervous disorder are present. Where you cannot determine certainly, try by having the child rest its open palm on your palm. Does the hand rest easily and naturally on yours, without jerky or irregular movements? If so, there is probably no serious chorea.

Effectiveness of tests. — These tests will eliminate the personal element in the teacher's judgment and may awaken him to some cases of nervousness which have not hitherto forced themselves upon him. When found they must be diagnosed and either the cause removed or the work so changed and lightened as to bring

less strain upon the child. With apparatus and with a physician's experience a teacher could do much better, but at the expense of an amount of time available to few teachers under present conditions. In short, a more elaborate scheme for testing lacks practicality except in the hands of a specialist or school physician delegated for the purpose. If such an official were available, the scope of the investigations suggested in these chapters would very properly constitute his chief duty, and this book would have its chief value in enabling the teacher to work with him more intelligently. Until then, the teachers, overworked as they usually are, must do what they can single-handed. By careful observation and frequent testing they may ward off an occasional incipient case of hysteria, epilepsy, or St. Vitus' dance; and will almost certainly be able to relieve the pressure upon children afflicted with the first stages of these neuroses.

Nervousness and the individual pupil.—Nothing can be much more conducive to nervousness than the attempt to fit all children to the same mental

groove. The mediæval scheme of lengthening out a man to fit an iron bed of torture by stretching him if he was too short, or reducing him to the proper size by cutting off a part if he was too long, has never met with marked approval. The reduction of all children to the same mental caliber in attainment or interest is equally culpable. Teachers must learn the limits of effective work for individuals. They must learn whether their stimulation of pupils incites to healthy work or to worry. Nagging, arbitrariness, impatience, lack of consideration result almost always in worry or pressure, though individual children may apparently resist these harmful conditions for a time and even for years. What will prove a healthy incentive to work for one pupil will be the reverse in another. Consequently there is need of a constant study of the individual effects of our method of rousing pupils to increased effort. If the child can be led to an interest in his studies for their own sakes, or if he feels that the teacher is a co-laborer with him, the element of worrying is removed and

the child's mental growth and work are healthy. It will never do to look for this interest and sympathy in the class as a whole. They must be sought in each member, and where they are not to be found, the causes of nervousness are certainly present.

Unusual restlessness. — Occasionally a teacher finds a whole class unusually restless. The reason for it may exist in the fatigue of the week or of some particular exercise, or it may be too obscure to be determined, though the restless condition is perfectly evident. Where this unrest exists, the teacher should, as soon as possible, dispel it, even at the cost of a school exercise. The teacher may have some pleasant and profitable exercise or game ready for just such an emergency. Let the children have an extra but quiet recess, a game, or a story. This may be followed in lower grades by a sleeping exercise, during which the children rest their arms on the desk and close their eyes for a few moments.

Individual children will frequently show this

marked nervousness during a single school session. Such a child, taken in time and given some diverting exercise, even if he loses some of his classes, will be vastly better off than if forced, for fear of evil consequences, to hold himself in by dint of will. Meet the nervousness of the class or of the individual at the moment it is discovered. Bring about relaxation or diversion of one sort or another. If these unusual nervous outbreaks are suffered to become usual, or if the teacher's eyes become blinded to them, great harm may result.

Most forms of nervousness seem to have an intimate connection with fatigue, so that an investigation of nervousness will naturally lead to this related topic.

CHAPTER VIII

FATIGUE

Nature and cause. — Fatigue, define it if you will as feeling, process, or "state," is in its effect reduced nerve force. As such it is easily distinguished from weariness which, though it may be equally deadening as far as any accomplishment of the tiresome task is concerned, still does not necessarily reduce the ability to put forth energy. That weariness and fatigue are usually associated is a matter of everyday experience. Weariness is psychical. It relates itself to the interests and desires. Fatigue is physiological and is directed especially to the nervous and muscular systems. The expenditure of energy would naturally imply fatigue or reduced nerve force, though it is partially offset by the lively recuperation of the healthy organism. Where this rebuilding takes place

rapidly the fatigue is called normal or "temporary" as distinguished from a more or less persistent "permanent," abnormal or "pathological" fatigue.

This reduction of the nervous system to a permanently diseased state may be due to a number of causes. These have been summarized in part among the causes of nervousness. Any constant drains on nerve force such as lack of proper food, outdoor air or sleep, baths, irregularity of habits, unhygienic conditions of home, school, or person, overpressure, disease, overwork,[1] studying too hard,[1] confusion, ambition, fear of teacher, of dreams, or dread stories, and so forth, produce fatigue. Usually children, though in great danger, are able to throw it off, but the weaker ones and others who are assailed by combinations of these causes succumb.

Results of fatigue. — But why study this fatigue? Will not the pupils know when they are tired and what to do about it? They may,

[1] *Usually* the scapegoat of other breaches of physical laws.

when it is temporary and marked, but probably will not, if it is slight or if it is of the pathological type. In this case a condition is present which merits the attention of both teacher and parent. The child is in real danger and (as far as real accomplishment is concerned) might better lose an arm or leg than fall a victim to permanent fatigue. He loses power of rapid recuperation. Development is checked, if not absolutely arrested. The whole "tone" of the system is lowered. He is rendered more liable to disease and when afflicted is brought to a lower ebb of vitality. The recovery of the normal self is considered doubtful in these cases. Certain it is that it is a slow process not infrequently extending over years, and then success only attends the greatest care.

Importance of tests. — It is a lack of appreciation of the far-reachingness of these effects that has led to a slight reaction against this line of investigation and has given rise to the remark that both we and the children *have* to get tired sometimes. True as that statement may

be, in view of the possible seriousness of the defect we should find out what children tire most easily, and if possible the reason. It may be the beginning of a permanent loss of nerve force. It may be the first sign of some insidious disease. It is surely a danger-signal most worthy of notice. Again, the clearness of the ideas aroused under our instruction is very dependent on the child's freedom from fatigue. Enthusiasm is almost impossible for any of us when we are tired out. Should a child be found in such a condition, we must recognize the fact. If we cannot remove the cause and therefore the fact, the child should be taken out of school or his work lightened, until his recovery of himself is assured. All authorities agree that muscles exercised after they have reached the fatigue point, recover the damage to the tissues slowly and, if this is continued, the result is likely to be chorea or paralysis of the muscle. We have even more reason to know the prostrating effects of mental operations continued beyond the lines of temporary fatigue.

Directions for practical tests. — The same tests[1] described under the head of "nervousness" are among the best for testing fatigue in a practical way, but they should be tried in this case at the beginning as well as the close of the school, or before as well as after the fatiguing exercise. I have detected a decided difference in tests made before and after a single severe mental exercise.

Symptoms. — In addition to the tests, it would certainly not be amiss for the teacher to glance over the class with the symptoms of fatigue in mind. These have been fully stated in a very suggestive article[2] on "Fatigue in School Children," which is quoted here: —

"Dangerous fatigue should be looked for, when the angles of the mouth are found depressed (usually denoting bodily pain); when there are horizontal furrows across the forehead that are not due to transient impressions (probably denoting mental anxiety); or when the eyes wander or 'fix' nowhere, the pupils are dilated,

[1] See p. 64. [2] By Dr. Smith Baker, *Ed. Rev.*, XV, p. 34.

or when there is fullness, or a blue coloration beneath the eyes; likewise when there is seen a broad white line encircling the mouth, or there are bright red 'blush-spots' on the cheeks or neck; when the skin is 'muddy' or hot or dry, and the pulse is noted to be unusually slow or rapid. With such children, all the bodily positions are apt to be awkward and 'lopping,' with the head bent forward and the shoulders held at different heights; while the movements are very generally asymmetrical, forceless, and few in number, and are perhaps jerky, or fidgety, or irritable, from unnatural increase of reflex activity. Also the fingers are apt to twitch, the face to be stolid, the tongue to be waywardly nimble, or else perhaps absolutely unresponsive and inactive, and the speech and voice noticeably altered in pitch and volume. . . . Upon inquiry, it will be found that he usually sleeps poorly, has nightmare, or grinds his teeths, or talks much, or 'flops round' while sleeping. Also that he emaciates rapidly and easily, and has frequent, inexplicable sick-spells; that in the

morning he is irritable, cross, and hysterical. Investigated more closely still, it often appears that such children cannot concentrate the attention for any length of time, and cannot associate images and ideas well enough to learn much or to retain what they do succeed in learning; also that they are mentally irritable and give evidence, even when very young, of a sense of painful nervous tension as well as of 'ill-being.' Sometimes they become morbidly dreamy, introspective, self-depreciative, and may get what has been styled a 'New England conscience,' whereupon there arises a 'duty stress' out of all proportion to any actual duty present. At this point they are apt to become fretful, perverse, sleepless, and to have all manner of 'morbid fears' and feelings and, ere long, to become depressed, hopeless, and utterly lethargic. Certainly the danger point is not very far off now. For in due time there will supervene what has been called the three 'cardinal symptoms' of danger, which all, whether old or young, should heed; namely, a very deep sense of misery in the

morning, one or more 'insistent ideas' which cannot be thrown off, and finally so thorough a wearing-out that the subject becomes anæsthetic to his fatigue, — that is, he is so weary that he cannot feel his own weariness. Obviously, children should never be allowed, much less compelled, to reach this condition of abnormally dangerous fatigue. If they do become thus endangered, some one, — parent, teacher, or supervisor, — is to blame. Often the home, or the 'system,' is absolutely at fault, and the teacher, no matter how devoted or skillful, is utterly unable to obviate results that are dire."

Scientific tests. — Scientists have attempted to test fatigue in many ways, both varied and ingenious. The fact that fatigue expresses a ratio between nerve force at the normal and after the expenditure of energy makes a mathematical statement possible. That those suffering from abnormal fatigue suffer the deepest drains on their nerve force when put to a fatiguing exercise makes it comparatively easy to fix upon the most serious cases. It is very doubtful if

any one test has been found that is satisfactory, but the best may be combined effectively. Some of these tests imply that fatigue reduces muscular power; others that it blunts the senses (a matter of much doubt in its first stages); still others that it affects the quickness or accuracy of mental operations performed. Where the fatigue is intense, or in extreme cases, this is true, but in cases of slight fatigue and to a certain degree in extreme fatigue, the interest or tiresomeness of the test, the ability and willingness to throw off fatigue temporarily, the effects of practice, the desire to excel or to be found peculiar, and other influences by the score serve to dampen the ardor of the investigator who feels for a moment that he has *the* method; and make it altogether probable that a really scientific method must combine the best.

Mosso invented the ergograph and the sphygmometer. The former measures the muscular power of the middle finger as it pulls a spring or raises a weight until exhausted. The validity of its results is in part affected by the varying

force of incentives and by practice. The sphygmometer registers the force and regularity of pulse-beat, but the sensitiveness of the pulse-beat to other mental or physical conditions works against its absolute reliability as an indicator of fatigue only.

Griesbach and others have used the æsthesiometer, or touch-dividers, to measure the power to determine the distance apart of the two points of contact after fatigue. He tried it on the tip of thumb, index-finger, nose, on the under lip, forehead, and cheek. His results seem very satisfactory, though hardly enough so to warrant the use of the æsthesiometer test alone. Not all the sources of error are removed by that.

Others have recorded differences in heart-beat and respiration or reaction-time.

In getting at the degree of fatigue from the mental side experimenters have tried multiplying and adding, copying, "taking" dictation, writing Greek paradigms, reading of extracts with words or syllables lacking which were to be filled in so as to make sense, memory of fig-

ures, solution of common-sense arithmetic problems, and so forth. In some of these fatigue is measured by ratio of errors; in others by the diminution in quickness, the nature of the experiment making one or another appropriate. Here the sources of error to which we have already referred play an even more important part.

As for their practicality, it seems hardly practicable to introduce such schemes for testing into the schoolroom, unless they are manipulated by a trained investigator who can give his whole time to this work.

Results of scientific investigation of fatigue in children. — The scientists have, however, already contributed to us some valuable suggestions which we may accept as conditionally proved.

1. The value of the short lesson period.

2. The value of the change or alternation of the easy and difficult school work.

3. The great difference in individual children in ability to recuperate or to throw off fatigue.

4. The decidedly exhaustive effects of both oral and written examinations.

5. The very *slight* drain on the system of manual labor.

6. The necessary reduction of home work to an amount which shall not interfere with hours of sleep sufficient to restore normal energy.

7. The strain on the child of learning by heart.

8. The importance of Monday and Tuesday for the best work.

9. The need of Wednesday as a half-holiday.

10. The comparatively short permanent effect of vacation, and the desirability of shorter, more frequent vacations.

11. The advantage of the morning over the afternoon, especially for some pupils.

12. Rest or recreation periods should increase in length as the day advances.

13. Kemsies believes his tests have demonstrated that a child ten to twelve years of age should not be in school more than four hours.

14. Mathematics and foreign languages are the most fatiguing subjects, singing and drawing among the least.[1]

[1] For order of studies arranged according to difficulty see page 168.

This is certainly an encouraging array of suggestions which is by no means complete, but at the same time represents quite fully the points of contact between the investigations of scientists and the needs of the schoolroom. Nor is it the least important outcome of the investigation of fatigue that we are coming to realize that those unfortunates who are suffering from the beginnings of permanent fatigue should be more carefully watched for, and children who have been wasted by disease should not be hurried back to school by teacher or parent as soon as they can stand, but should be allowed to gain their normal nerve power first.

CHAPTER IX

DISEASE

The gauntlet run by the child. — Most terrifying are the percentages showing the death-rate in the first five years of the child's life. In Chicago statistics for 1894 show that one child out of every twenty of five years and younger died during this period. In the next five years the death-rate was only one out of every one hundred and seventy-five; the succeeding *ten* years a death-rate of one out of each three hundred and twenty-two. During the school age, therefore, the children are for the most part strong enough to resist death, but this does not imply that they are necessarily healthy. On the contrary, the terrible gauntlet of disease run by children from the time of birth to their sixth birthday has left its mark on far more children than those who succumbed to it. The sight, hearing, lungs, cir-

culation, stomach, or even the mind, may have been somewhat affected, while the disposition of the child may be practically moulded by these early experiences.

Information to be collected by the careful teacher. — These conditions the school must recognize. Upon these it should inform itself. Blanks on which are questions to be answered by the parents should be sent home. They should ask for details regarding the child's past record for health, any effects of disease upon the child, the normal rate of pulse-beat, the present state of his health, how much and when he sleeps, how often, how much and when he eats, what sort of food he prefers, and any other points desired by the teacher, after he has become acquainted with the child. If to the answers of his questions are added the results of his motor, fatigue, and nervousness tests, the teacher will have most important data as to the child's health and strength, not at the moment only, but on the average. Comparison of the child's record at any given moment with the normal is therefore

made possible. The first manifestations of disease will not then be understood as stubbornness or stupidity, but rather as the evidences of the imperfect physical or mental conditions which really exist.

Guarding against contagion. — Among the diseases most dangerous to children during their school life are scarlet fever and diphtheria. Children are usually too ill from the beginning to come to school, while there is much probability of spreading these diseases, although they are transmitted occasionally. It is the duty of every teacher to inquire into the child's state of health after such an illness, and to see to it that school books or any other material handled by the child either during his illness or immediately before his illness have been burned. Carelessness in dealing with cases where outbreaks occur is most serious in its results. In Michigan the records kept revealed the following facts: Where the case of scarlet fever was not isolated, there were over thirteen cases and a little less than one death on the average for each outbreak.

Where it was isolated there were only two cases and a fraction for each outbreak, and only one death to about eight outbreaks. About one case in twenty results in death. If we can reduce the total number of cases, we reduce the number of deaths. Almost the same number of cases of contagion with only a fractional increase resulted from an outbreak of diphtheria. In this disease, however, about one in five of the victims die. So that preventing cases becomes even more nearly equivalent to saving life. Teachers should be careful to excuse from school the child who does not feel well, especially if his face be flushed or his throat sore. The causes aside from infection are subtle and not to be warded off except by care. Foul air tends to produce favorable conditions for infection.[1]

In scarlet fever the disease is communicated by the poison given out by the bodies of the sick. This may occur at any time from the

[1] For regulations governing treatment of contagion in the schools, see page 160.

beginning of the illness to its end. Clothing and other things which have come in contact with these children will retain their infection for years, unless thoroughly disinfected. In diphtheria the discharges from nose and throat are the greatest source of danger. The breath may carry germs a short distance, but they are more often carried by the handkerchief to clothing, desk, and floor, not to mention drinking cups, towels, and so forth.

Of the other contagious diseases, cholera, typhoid fever, and yellow fever are not spread very much by schools where a good city water supply and well-flushed closets are provided. If water from wells, or if closets not connected with a city sewerage system are used, the greatest care should be taken to keep germs from reaching the water supply, and to guard against the contamination of the school air (and that of the closets also, as far as possible). Pails or pitchers of drinking water should never stand uncovered in a schoolroom. Small-pox is guarded against by rigid rules regarding vaccination, and

the number of cases reduced to practically zero.

Tuberculosis is one of those diseases communicated by the school, meriting more detailed mention. The sputum from infected lungs dries, becomes a part of the dust of a room, is inhaled by the children. Those most susceptible are infected, and the disease spreads. Here is work for the school physician. In some cities all children afflicted have been excluded. In others the pupils diseased have been provided with an especial receptacle for the sputum, in the hope that the germs may thus be kept out of the dust of the room. Usually the remedy has been careful sweeping, followed by a careful dusting of the room, furniture, and wainscoting. This is sometimes made more effective by sprinkling the floors with chopped straw previously soaked in some disinfecting solution, chloride of lime, for example. Besides this, great stress must be laid on the value of ventilation, in particular the outlets for the vitiated air, which should be near the floor, and should carry off

the air bearing disease germs, while the incoming air dilutes and reduces the amount of disease-laden air. Common drinking-cups and towels should be interdicted.

Of the less dangerous contagious diseases, the germ in mumps is also carried by the breath; in measles by breath and skin; in skin diseases generally, including those of eyes and scalp, they are rubbed off by handkerchiefs, towels, etc., or fall off and mix with the dust.

Conditions aggravating disease. — Tuberculosis, rickets, bronchitis, catarrh, headaches, are aggravated, if not brought on, by impure air; chorea, by fatigue of the muscles; spinal diseases, by bad posture in sitting or in writing; indigestion and constipation, by too much restraint and sedentary occupation; bad eyes by bad positions of book, paper, or light; nervousness, by too much pressure, too much worry, and last, but by no means least, nervousness in those about them, where it is possible that the teacher is at fault.

Cigarettes and their record. — Cigarette smoking is an evil that deserves attention by itself. It

tends to nervousness of the physical type and to stupidity. An examination made in Chicago[1] schools revealed the fact that it took the children who smoked longer to make a grade than non-smokers. Twenty-five principals were prepared to affirm that it took two years or longer, and twelve that smokers rarely "made a grade" in the strict sense. They were shoved along after a couple of years because there was no other place for them. Much can be done by a teacher who has the confidence of his pupils either by personal talks or by forming an anti-tobacco club. Most teachers are surprised when they attempt this sort of thing at the influence that they really possess. The direction to change clothing where the odor of tobacco is detected is also helpful.

Treatment of thin and pale children. — Some children are thin and pale. They lack blood, are usually nervous, not infrequently dyspeptic. They easily become fatigued, incline to remain at home, and read rather than play outdoors.

[1] *Child-Study Monthly*, May, 1897: "Cigarette Evil in Schools."

They should be lured out of doors on every possible occasion, and not allowed to stay in at recess. Some of them should be taken out of school until they have gained the desired strength and health. Disease, cigarettes, inadequate food, lack of sleep or clothing, may be responsible for this weakness or pallor. Our health record will help in these cases to give the teacher a clew as to some of the conditions which may be interfering with the child's system of circulation. The discovery of the cause leaves only its removal necessary for the child to become normal again.

Inadequate or irregular food. — We have already had occasion to notice the effects of inadequate food. The strain upon the child from this cause, resulting in nervousness, fatigue, and other disorders, is worthy of our investigation. Several questions deserve an answer. Does the child eat a hurried breakfast and then rush to school? Does he eat sweet things and refuse simple, wholesome food? To what degree? Does he eat cake and candy for his lunch,

or does he bring bread and butter? In many localities, especially where the children come to school poorly nourished, lunches are looked after by the teachers. Bread and butter or fruit should be the custom. Where the food is served from a common supply contributed by the children, there is great danger of spreading contagious disease. To lead parents to see the importance of a determined effort to have the children ordinarily eat such food as is good for them, is difficult but worthy of the attempt. Simple, well-cooked fare, and plenty of it, should be the rule. Change of food is also a requisite. Some children, as well as grown people, cannot eat certain kinds of food with comfort. These kinds are to be avoided.

CHAPTER X

HABITS OF POSTURE

Importance of subject (a) *for health.* — In studying different postures of children there is danger of leaving the realm of the practical. But, when it is remembered that the breathing of some children is seriously hampered by bad positions, that the circulation of the blood in arms, legs, and back is often interfered with, that the spine is twisted or bent out of normal position in about thirty-five per cent of school children, that the stomach is used as a kind of prop, and that the ordinary position assumed by the child is anything but restful and symmetrical, it will be seen that there are certain distinctly practical features involved in a study of these habits.

Importance of subject (b) *as a key to the child's mental life.* — The posture is also significant not merely because of its actual impairment of some

of the necessary life processes, but because it furnishes us indications of habitual modes of thought in children. We shall, therefore, have occasion to consider posture in this second relation, not that we may expect thereby positive help in building up mental strength, but that we may have for corrective purposes a slight clew at least to the child's harmful types of thought or attitudes of mind. A disdainful turn of the chin and lifting of the head are not acquired by a child without mental correlatives. The records go to show that with that look, and with that turn of the chin, and raising of the head, is an attitude of mind which shuts off its possessor from sympathetic contact with the world. William Hawley Smith tells of a teacher who with downcast face, as though ashamed, said that she "taught in the country." He immediately cried, "Look *up!* Look *up!* There are few places of influence within the teacher's grasp equal to a country school." This posture itself he recognized as tending to bring about a better mental attitude. In the following passage, Professor

James of Harvard points out the tendency of the external posture and movement to arouse corresponding mental coördinates: "In rage, it is notorious how we work ourselves up to a climax by repeated outbreaks of expression. Refuse to express a passion, and it dies. Count ten before venting your anger, and its occasion seems ridiculous. Whistling to keep up courage is no figure of speech. On the other hand, sit all day in a moping posture, sigh, and reply to everything with a dismal voice, and your melancholy lingers."

In investigating habits of posture of whatever type, our attention should be directed especially to the head, the hand, the chest, shoulder, back and spine, and any fidgeting or frequent change of posture. A balance, symmetry, and ease in the position of each member should exist. In most of these cases our weakness lies in the postures which we allow the children to take. Our ideals are low. The attention necessary to secure good habits of posture requires unmitigating effort on our part. We shirk our responsibility both in the school and in the home.

Sitting. — The student in his seat or chair is usually engaged in one of three occupations, — writing, reading, or conversation. His posture may be very good in one of these three, and be very unsatisfactory in the other two. Writing has been mentioned first because more frequently is a wrong position taken and maintained in writing than in reading or conversation.

There are one or two considerations which belong to all three of these occupations. In the first place, the feet of the pupil should be able to touch the floor naturally, so that the sole of each foot may rest flat upon it. The seat should be just high enough for the child's feet to reach the floor with the legs in a perpendicular position. The width of the seat should be sufficient to come within two or three inches of the back part of the knee, and its surface should be very nearly horizontal, with a very slight slope backward. A support, at least for the small of the back, should be provided.

Writing. — In writing, it is not only necessary that the seat be properly adjusted, but it is also

highly desirable that the desk be properly constructed. I have seen but one desk which met the requirements. For some reason, probably cost of construction or the conservatism of teachers, all school-furniture firms have been very slow to recognize the importance of the "minus distance," or projection of the desk top horizontally over the front edge of the seat. It has until recently been considered quite satisfactory, if a line dropped from the lower edge of the desk perpendicularly would meet the outer edge of the seat. Unless a boy is remarkably stout, he must, to use such a desk, necessarily lean forward, straining the muscles of the back and interfering seriously with his ability to breathe freely. I have no hesitation in claiming that we must throw away our conservatism on this point, and that the rule should be to make the desk come just as far toward the pupil as it can without actually touching him. There will then be a "minus distance" of not merely one or two inches, as some of those whom we would call almost extreme are

claiming, but frequently a "minus distance" of five or six inches. This will of course necessitate either a folding desk top or a sliding cover. It should also be possible to raise or lower the desk until the arms rest easily upon it.[1]

Children used to write with their sides toward the desk, the right arm wholly and the left partly supported by it. This position raised the right shoulder and caused the left shoulder to droop, destroying all symmetry and tending to cause lateral curvature of the spine. The child should face the desk directly, resting both feet squarely on the floor, and supported by them and his chair. The arms and hands should be on the desk, thus tending to push back the shoulders. If this posture is taken, the head will be erect, the arms will offer a support, the chest will be easily filled, the shoulders will be on a level, the back will be straight, and the position can be maintained for some considerable time without much fatigue.

[1] Such a desk, with a minus distance of three and a half inches, has been described by Dr. Shaw in the *Child-Study Monthly*, Vol. I, page 226.

Reading or study. — In reading, the position, as far as the seat is concerned, has already been described. Care should be taken that the eyes do not get too near the book and that the head does not fall forward. Slipping down in the seat tends to flatten the chest and to bend the spine. This is especially tempting to the child when the seat is too high. It should be possible to raise or lower the seat as well as the desk. The school-furniture firm appealed to the sympathetic experience of teachers when it advertised, "Oh! you would wiggle too." In general, the attempt of the child to assume an unbalanced and unsymmetrical position in its seat is an indication of some mal-adjustment of either external or mental conditions.

The fatigue due to general overwork or to maintaining the same position too long, without yielding to nature's demand for change, will lead the child to assume a bad posture unconsciously. Among the effects of weariness of this sort is the tendency to let the body sink forward upon the stomach. The hard-working

student or farmer will both show in their postures the marks of the fatigue peculiar to their habitual occupations.

The writer has for a number of years observed in himself and others on whom he has tried it, the increased ability to concentrate the mind on mental work, if the body leans forward. If you are skeptical, try it the next time you find your mind wandering. Set the feet squarely on the floor. Bend forward so that the elbows may rest on the knees, and your power of concentration will be doubled.

In conversation little direction is needed, as the student will naturally change his position. In fact, we all do so as often as we feel conscious of any discomfort. Watchfulness is needed here to prevent lounging. One cannot be sprightly, bright, or at his best in conversation, without taking an erect posture with head up, chest out, and shoulders level. Physical relaxation implies mental relaxation.

Standing. — In standing rather than in sitting we see the habitual modes of thought of the

student finding expression. The boy whose head is erect, who stands up like a "major," is evidently self-confident, is conscious of his power. The boy with head sinking forward is conscious of weakness, a weakness which may be either mental, physical, or moral. Similarly, bent or stooping shoulders would indicate an attitude of mind submissive to burdens. Swaying hands, arms, or body would indicate lack of self-control.

Exceptions. — Due regard should be given exceptions, and protest should be made against the measurement of all students by averages. Thick lips on the average betoken vulgarity. But what is true of the general cannot be asserted of the individual case. Hands which become blue and cold even in mild weather are frequently accompanied by some physical or mental defect. That this is always the case does not follow, and care should be taken not to imply this. Though it may be true that abnormal physical development in certain directions usually indicates defective mental develop-

ment, it is important in each individual instance that both teacher and parent take nothing for granted, but regard these physical peculiarities as hints of *possible* mental defect or peculiarity. That this interrelation between mind and matter is only normally true, we know from hundreds of exceptions. That these weaknesses of the child's physical and psychical nature give way before studious and wise treatment, has likewise been shown again and again.

Test questions of standing position. — In order, however, to give the best possible external series of habits, that we may have the best internal attitudes, let us look to the positions which the children commonly take in standing. Is the head erect, not bending forward, and not elevating the chin? Do the hand and arm fall easily into their positions without swaying and without movement? Are the shoulders thrown back? Is the chest thrown forward? Is the back straight? Is the abdomen unduly prominent, or does it fall within a straight line dropped from the chest? Is the position on the whole

symmetrical? Is the weight on both feet? Are the feet together and the knees straight? Is the position restful, free from uneasy movement?

The antithesis comprising opposite characteristics is seen in the typical loafer, who, leaning up against a building, with head falling forward, chest flat, one shoulder higher than the other, with back bowed, the knees bent, and the weight on one leg, furnishes a picture presenting a low stage of physical, mental, and moral development.

Sleep. — As about a third of our time is spent in sleep, the habitual postures taken there must naturally have some effect. In the main, of course, there is fairly complete relaxation, but at the same time we must provide for free breathing, and the easy circulation of the blood. We must give the heart easy action, and not weigh down or constrict different parts of the body. The head should be a little raised so as to reduce the pressure of the blood on the brain. Plenty of fresh air should be provided

without any possibility of draughts. Breathing is much easier when lying on the side.

An occasional change of the reclining position is desirable, and should become habitual. It will lead us to adapt ourselves to special conditions either physical or purely external. It is unwise, were it possible, to make the child keep one posture while asleep.

Lying on the right side gives the heart freer action. It also relieves a congested or enlarged liver and a full stomach, while the flatulent stomach is eased by reclining on the left side, or more satisfactorily by an erect posture.

An educator of note, having determined to break up a tendency toward round shoulders, slept for several years with a pillow under the small of his back, thus paying a tribute to the power of habit, even in its operations during sleep. The results were good, though it is probable that the posture necessary to produce them might have worked injury to weaker physiques

CHAPTER XI

HABITS OF MOVEMENT

Kinds of movement. — Tendencies have already been touched upon in the chapter on motor ability. It remains to emphasize more particularly types of habit, which may have fixed themselves upon these motor tendencies. The movements of the child may be thought of as spontaneous or involuntary, and expressive or voluntary.

The significance of involuntary movement. — Nature has provided the child with a complex system of reflex movements. These are very uniform, and consist almost entirely of fundamental life processes. As such they are of less practical interest, as they can hardly be improved upon, and, unless it be during adolescence, they lack especial mental significance altogether.

The young child, groping after knowledge and

seeking new combinations of nervous action, is impelled by instinct at first, and later by reason, to move different parts of his body. Some of the resultant movements are found pleasurable or useful, are repeated, and fixed as habits; others, leading to no particular advantage, are not made again except by accident.

Some habits, previously supposed to be the result of random motor combinations, have been found to be due to some advantage presenting itself sub-consciously. The seemingly useless habits of scratching the head, stroking the beard, pulling the mustache, rubbing the forehead, gum-chewing, pressing the eyes, tapping the nose, are examples of a large class which tend to irritate branches of the fifth nerve, and so increase the blood-supply of the brain through the carotid arteries. The gustatory branch of this nerve is also stimulated by mastication, or by the smoke of cigar or cigarette. Marey has proved that mastication accelerates to a rather marked degree the flow of blood through the carotid artery. These arteries not only supply in one of their

branches the face, scalp, and salivary glands, but through their internal branch enter the brain, which also receives blood through the vertebral arteries. Similarly, the ends of the nerve in the mucous membrane of the nose respond to the action of snuff by increasing the cerebral circulation.

Tests of involuntary movements. — Our interest in these and similar involuntary movements centers in the desirability of the movement. Do they interfere with the child's health? Do they offer obstructions to his free development mentally, morally, or physically? The large number of nervous, twitching movements indicative of chorea,[1] incipient or well-advanced, must be counted among the most dangerous of involuntary movements.

Significance of expressive movements. — Among the purposive and expressive habits of movement are to be included first of all those of the facial muscles, of the head, arms, and shoulders especially, while the legs and feet contribute much to expression, particularly in connection with the

[1] See chapter on nervousness, page 65.

other parts of the body in walking. That ideas tend to movement has already been pointed out. If this be the case, the habits formed must have especial significance. Since, too, there is less consciousness of self in action than in holding a stationary position, we should expect rather in movement, than in posture, to find the freest play of the mind's expression. This relation between ideas and movement has been recognized by at least one school of physical culture and oratory, which has enthusiastically insisted upon real enthusiasms, real purposes, before any attempt at expression is allowed. The same is true of the old Roman school of Quintilian, who advocated perfection of knowledge and of character as the requisite of the perfect orator. A sunny face seldom hides a dreary life, a sullen face seldom a happy, hopeful disposition. We should study the faces of the children for what they reveal of character, and the other forms of movement for what they will indicate as to the child's habitual attitude of mind toward the problems of its world.

"The young recruit is 'appy — 'e throws a chest to suit;
You see 'im grow mustaches; you 'ear 'im slap 'is boot."

In the opinion of science, the phrenologist would not be very successful in his results, if limited only to the bumps or peculiarities of skulls; but when confronted by faces, the expression of which in many lines represents usual habits of thought, emotion, and volition, it is not strange that some of his guesses should be successful. Add to this a number of movements, be they only those involved in entering the room where the phrenologist is, or in taking a position near him, each movement representing a certain efficiency and power or the reverse, and the mystery has disappeared.

Kinds of tests desirable. — Accordingly our tests for habits of movement must be not so much for those movements which are most healthy from the physical standpoint, but rather for those expressing the child's fundamental attitude of mind toward the world. Is it hopeful? Is it sympathetic? Does it expect good from others? Does it express purpose, determination? Is it honest?

Walking. — The ability to control and move the finger with a greater or less degree of variety, precision, and rapidity, is said to be indicative of a greater or less degree of intelligence. However, the interpretation of various habits of movement, especially in finer muscles such as those of the face and fingers, offers a basis of judgment only to the expert observer, and then within certain limits. The functioning of larger muscles admits of readier investigation, and departures from the normal or the ideal are more marked. The most practical study is found in the carriage of the body in walking, though parallel studies of other forms of movement will suggest themselves.

In walking we have a number of types. Here is the large, growing, uncontrolled, awkward boy, who waddles along. Another, smaller, thinner, less healthy, seems almost to sneak. A shuffling gait bespeaks the careless, irresponsible, ambitionless boy, while other gaits are characterized by their aimlessness, by their abandon, or, to look on the better side, by their directness,

straightforwardness, their springiness, their firmness or ease. In one type of child the head hangs forward, the shoulders droop, the chest is flat, while in walking, the back is slightly bent, and the head and shoulders lead. In the carriage of some children the head is erect, the chest out full, but the abdomen is made prominent and leads, whereas others are marked by the almost perfect ease, grace, and power of their movement.

What to observe. — The home training and that of the school may have in part interfered with the expression of the inner state of mind through the gait, but in the main we find very varied results even where apparently similar conditions have existed. We must look first of all for balance or symmetry[1] of the parts of the body, secondly, for strength or force of movement, and thirdly, for energy and activity. If any one of these three is lacking, the probabilities are that the mind itself also needs a corresponding energy, symmetry, or force.

[1] This cannot be expected to be perfect, if the child is growing rapidly.

Further observations. — The balance or symmetry of the child may be shown in his bearing, as he walks. Again, it may be observed in his sports and recreations, which may well be studied for data along the same lines. Again, the playground, the choice of forms of recreation, and the spirit in which they are entered upon are very significant of the real habit and attitude of mind peculiar to the child, and underlying not only his strength and force of movement, but his energy and activity also.

On the playground, however, no opportunity for controlling and training the child is offered, his movements are very complex, and only semi-habitual as compared even with those involved in walking. Nor will the child's gait prove inconsistent in its meaning with his choice of exercise and his demeanor in it. The same character underlies both. And, though we are unable easily, as teachers, to enlist more activity and force in his play, we can in some degree, at least, introduce them into his gait in walking and his recreative or physical culture exercises.

They are under our direction. We should see that they make possible mental symmetry, mental force, mental activity.

Outward form and inner content. — Were it impossible to affect the mind through the body and its habits of movement, these questions could be of no practical value; but we have learned that military training and even ordinary drill not only cause boys to appear more manly, but really lead them to a higher degree of manliness. They are not only rendered apparently obedient, but through the external movement they have imbibed a respect and esteem for obedience itself. Children have been encouraged by common consent to put pennies in the contribution-box, even before they could have any real conception of the meaning of the act. Let the habit once be secured, and the meaning, the content, will fill in itself. This is simply an application of the racial principle of development, — that custom precedes morality. But still wider in its application is the use of imitation as a stimulus both to movement

and corresponding intellectual activity. We know that the hopeless, sad child can be made more hopeful by leading it to more hopeful forms of activity, by giving it association with more hopeful children, and by assisting the desired ideas to find lodgment either through or in company with their outer expression.

CHAPTER XII

GROWTH AND ADOLESCENCE

Interest in growth. — One of the most interesting topics to parents is that of growth. Each is anxious to compare his child with others as to height and weight and brightness. Perhaps one reason for this is the fact that growth is one of the evident points of comparison. The mother, too, can be proud of her own children's development (or imagines she can) without boastfulness and conceit. There is, however, another and more serious reason for the importance of a study of the child's growth. This will become more evident after a brief explanation.

Comparative regularity. — In spite of the fact that the extremes both in the height and weight of children are widely different, it is still true that the normal or average height and weight, and especially the normal increase for each year,

are very closely approximated by the height and weight of the average child. This is so true that any irregularity in the growth would indicate bad conditions. This growth of the body is in its order practically stable, and variations in the time for each sex are not great. It is also coördinate with a development of the mind. A new physical accomplishment carries with it a correspondingly new field of mental activity and development.

Physical development and brightness. — It has been claimed that the taller and heavier children are the brighter, and some figures would seem to bear this out; but that there is any causal relation between the two seems very doubtful. It is more probable that the same good conditions of nutrition, rest, freedom from disease, care, and undue toil, which promote bodily growth most markedly, also develop a nervous system capable of activity and endurance. These same good conditions are, perhaps, responsible for the significance frequently assigned to girth of chest, as an indicator of

growth, and it is doubtless true that a certain correspondence between mental achievement and the girth of chest does exist on the average.

Children below normal. — But interesting as these facts are to those whose children fulfill the requirements of the standard, they are still more significant and important for the child who falls below the standard. Interruptions to growth are not so easily made up as we might believe. "As the twig is bent, the tree is inclined." A scar always remains a weak spot. The growth is never perfect there. Diseases affecting the teeth of children leave a permanent deformity. If a child fails to attain its normal physical or mental growth at any given period, it is not reasonable to suppose that it will make up this deficiency without a permanent loss of some kind, though it may not show itself in weight and height.

Causes of defective physical growth. — Dr. Bayard Holmes has classified the obstructions or interruptions to normal physical growth as follows: first, inadequate food and clothing; sec-

ond, injuries and diseases; third, over-stimulating or under-stimulating environments; fourth, artificial restraint; and fifth, untimely toil. To these should be added racial influence, which is rather persistent, and in some cases, notably the Japanese, quite marked in degree.

There exists at present no satisfactory data for demonstrating scientifically the obstructive importance of each of these conditions except where race, disease, and bad nutrition are concerned. The others have so much of reasonableness, however, that we may well anticipate scientific data with our tentative results. Some of our best studies of growth have in part failed because they have given too little consideration to these other possible, if not actual, influences.

Artificial feeding in infancy, and in later life the use of baker's bread among the poor, foods "prepared for sale and not for use," and the inadequate clothing of the poor are prominent causes of stunted growth over which we have little control without arousing public sentiment.

In wealthy families frequently no better results are obtained, because the child is so often allowed to select the food which pleases him most, rather than what is "set before him." The teacher's attention has already been called to this by the questions she would ask regarding the child's past record for health as pointed out in the chapter on diseases.[1]

In the same chapter, attention has already been called to the terrible ravages of disease in the first five years of a child's life. In the records of Germany for 1892, almost twenty-three per cent of the deaths for that year were among children less than one year old; in Saxony, almost thirty per cent. The maximum power of resistance to disease is found from the sixth to the twelfth year. The percentages of deaths are, therefore, not so appalling for the school age, but the large number of sequels to the ravages of these diseases in early years are found in their traces as shown by defective sense power and over or under sensitive nerve

[1] See pages 84 and 91.

development. To show how to search for these disease effects has been one of the aims of the previous chapters. The accidental injuries of children are even more difficult to guard against, but such practices as boxing or pulling the ears, and in less orderly homes indiscriminate punishment, deserve especial mention.

The child of the cities, with his quick wit and untimely slyness, is an example of over-stimulation, and very frequently we are deceived into thinking him more remarkable by judging his age from his size. He frequently seems several years younger than he really is. He is almost always short, whereas the hard-working and hard-worked boy from the country is only partly saved from a similar stuntedness by his usually superior conditions for nutrition and freedom from restraint. The pampered city boy or the lazy and idle country boy alike suffer from under-stimulation.

Happily, modern methods and child-study have led to a more general recognition of the necessity of activity both for mental and physi-

cal development, and we can feel that our schools, and our homes as well, are freer from that artificial restraint which formerly made children so self-conscious, priggish, and nervous.

Dr. Holmes pays especial attention to the last in his list of causes of obstruction to physical growth, namely, untimely toil. He shows, first, that the children are not needed economically; secondly, that they are working for practically nothing; thirdly, that the exacting hours soon use up the vital forces, stunt the growth, and benumb the mind and conscience. The truth of this will be affirmed by any teacher who has had to deal with children of this sort. He asserts that "child labor is probably the most dreadful interference of child growth outside of underfeeding from which the next generation of this republic now suffers." His conclusion is one which must appeal to the heart of every educator: "A life free from want, care, and toil is necessary for the mental and physical development of the child; and since the physical stature is not complete be-

fore the nineteenth or twentieth year of life, every child is entitled to nineteen or twenty years of youth free from toil."

Possibility of removing causes. — The importance of our tests of growth is not merely of interest, in that we may search out causes, but it is also heightened by the fact that almost all of these causes may be removed. Inadequate food and child labor can and must be made impossible by proper social conditions, which it is the business of those interested in the training of youth to insure, as society tends toward its reorganization. The hindrance represented by disease must be met by increased education along the lines of hygiene, and the employment of physicians, not to cure, but to prevent illness; and improper environment, by removing causes. Artificial restraint can be almost entirely done away with by more professional training of teachers, while the over-stimulating or under-stimulating environments of children can only be relieved by a general education and enlightenment of man as to conditions necessary

for the enjoyment of their right to freedom of development.

The test of growth. — In order that a teacher or parent may fulfill his duty in removing obstructions to the growth of the child, it is first necessary to know where they exist. This would imply a knowledge of the height, weight, and girth of chest normal for his age, and also the knowledge of the child's actual measurements. The test will, therefore, consist merely in determining the height, weight, and girth of chest, and comparing the same with the normal. Where the children fall short, a search should be made for the causes. The classification made above will serve as a guide to these. If possible, they should be removed, before permanent or serious injury results.

Tables of average growth. — Below are arranged tables for normals for height, weight, girth of chest, and average deviations from the normal in height, and girth of chest, representing the growth of children in different parts of our country. They are as authoritative as any that we have.

TABLE A. FOR HEIGHT

Showing the average American height mathematically calculated by Dr. Franz Boas from the data of 45,151 boys and 43,298 girls in the cities of Boston, St. Louis, Milwaukee, Worcester, Toronto, and Oakland (Cal.); also the absolute and the percentage annual increases of same. (Printed by permission of G. Stanley Hall, editor of the Pedagogical Seminary.)

Approximate average age	Boys				Girls			
	Number of observations	Average for each year. Inches	Absolute annual increase. Inches	Percentage annual increase. Per cent	Number of observations	Average for each year. Inches	Absolute annual increase. Inches	Percentage annual increase. Per cent
5	1535	41.7	2.2	5.3	1260	41.3	2.0	4.8
6½	3975	43.9	2.1	4.8	3618	43.3	2.4	5.5
7½	5379	46.0	2.8	6.1	4913	45.7	2.0	4.4
8½	5633	48.8	1.2	2.5	5289	47.7	2.0	4.2
9	5531	50.0	1.9	3.8	5132	49.7	2.0	4.0
10½	5151	51.9	1.7	3.3	4827	51.7	2.1	4.1
11½	4759	53.6	1.8	3.4	4507	53.8	2.3	4.3
12½	4205	55.4	2.1	3.8	4187	56.1	2.4	4.3
13½	3573	57.5	2.5	4.3	3411	58.5	1.9	3.2
14½	2518	60.0	2.9	4.8	2537	60.4	1.2	2.0
15½	1481	62.9	2.0	3.2	1656	61.6	0.6	1.0
16½	753	64.9	1.6	2.5	1171	62.2	0.5	0.8
17½	429	66.5	0.9	1.4	790	62.7		
18½	229	67.4						

Table B. For Weight

Showing the average American weight, mathematically calculated from the data of about 68,000 children in the cities of Boston, St. Louis, and Milwaukee; also absolute and percentage annual increases of same. (Printed by permission of G. Stanley Hall, editor of the Pedagogical Seminary.)

Age	Boys			Girls		
	Average for each age. Pounds	Absolute annual increase. Pounds	Annual Increase. Per cent	Average for each age. Pounds	Absolute annual increase. Pounds	Annual increase. Per cent
6½	45.2	....	....	43.4	....	....
7½	49.5	4.3	9.5	47.7	4.3	9.9
8½	54.5	5.0	10.1	52.5	4.8	10.0
9½	59.6	5.1	9.3	57.4	4.9	9.3
10½	65.4	5.8	9.7	62.9	5.5	9.6
11½	70.7	5.3	8.1	69.5	6.6	10.5
12½	76.9	6.2	8.7	78.7	9.2	13.2
13½	84.8	7.9	10.3	88.7	10.0	12.7
14½	95.2	10.4	12.3	98.3	9.6	11.9
15½	107.4	12.2	12.8	106.7	8.4	8.5
16½	121.0	13.6	12.7	112.3	5.6	5.2
17½	....	....	....	115.4	3.1	2.8
18½	....	....	....	114.9	....	....

TABLE C. FOR GIRTH OF CHEST[1]

Showing the average girth of chest midway between expiration and inspiration for each age selected from elaborate tables made by William Townsend Porter on about 30,000 St. Louis children; also the absolute annual increase and the percentage annual increase. (*Printed by permission of Dr. William Townsend Porter.*)

Approximate average age	Boys				Girls			
	Number of observations	Averages for each year in inches	Absolute annual increase in inches	Percentage annual increase. Per cent	Number of observations	Averages for each year in inches	Absolute annual increase in inches	Percentage annual increase. Per cent
6	677	23.24	....	....	741	22.97	....	....
7	1708	23.87	.63	2.7	1631	23.41	.44	1.9
8	2095	24.48	.61	2.6	2040	23.94	.53	2.3
9	2120	25.16	.68	2.8	1966	24.61	.67	2.8
10	1997	25.80	.64	2.6	1893	24.81	.20	.8
11	1732	26.47	.67	2.5	1654	25.92	1.11	4.5
12	1565	27.07	.60	2.3	1624	26.89	.97	3.8
13	1228	27.80	.73	2.7	1313	28.07	1.18	4.3
14	925	28.85	1.05	3.8	1020	28.79	.72	4.0
15	498	30.14	1.27	4.5	659	30.23	1.44	3.6
16	205	31.19	1.04	3.5	397	31.04	.81	2.7
17	80	32.04	.85	2.7	206	31.65	.61	2.0
18	31	33.27	1.23	3.8	162	31.67	.02	0.1
19	82	....	....	....	82	31.14	....	....
20	66	....	....	....	66	31.71	....	....

[1] "Obtained by adding the girth of chest at full inspiration to the girth of chest at full expiration, and dividing by 2."

TABLE D. FOR DEVIATIONS IN HEIGHT AND IN GIRTH OF CHEST[1]

Showing the probable deviation from the average height and girth of chest computed in inches from tables made in centimetres by William Townsend Porter on more than 30,000 St. Louis children. (Printed by permission of Dr. William Townsend Porter.)

	PROBABLE DEVIATION IN HEIGHT				PROBABLE DEVIATION[1] IN GIRTH OF CHEST			
Approximate average age	Number of observations	Boys	Number of observations	Girls	Number of observations	Boys	Number of observations	Girls
6	709	±1.34	780	±1.35	677	±.87	741	±.98
7	1850	1.42	1791	1.48	1708	.94	1631	.97
8	2223	1.53	2193	1.46	2095	.92	2040	.94
9	2205	1.48	2122	1.51	2120	.99	1966	1.00
10	2087	1.57	2053	1.60	1997	.87	1893	1.05
11	1819	1.67	1772	1.76	1732	1.03	1654	1.20
12	1653	1.76	1732	2.06	1565	1.16	1624	1.28
13	1268	1.96	1322	2.15	1228	1.22	1313	1.39
14	925	2.20	1085	2.03	925	1.41	1020	1.44
15	490	2.49	680	1.58	498	1.48	659	1.46
16	189	2.31	420	1.59	205	1.65	397	1.29
17	78	2.02	206	1.36	80	1.24	206	1.31
18	29	1.96	164	1.33	31	1.16	162	1.27
19	....	....	85	1.59	....	....	82	1.35
20	....	....	79	1.21	....	....	66	1.09

[1] "Obtained by adding the girth of chest at full inspiration to the girth of chest at full expiration, and dividing by 2."

These averages are made up according to the number of children on which data are furnished by each city. In Table B, Bowditch furnishes records for 24,500 children from Boston; Porter 34,500 from St. Louis; and Peckham 9600 from Milwaukee. The agreement between the figures is not as uniform as might be expected.

Tables A, B, C, and D furnish valuable means for the comparison of measurements of a given child with the normal for our country. Where the child falls very much short of these, either in actual size or the rate of growth, an investigation of the cause should be made. It should be remembered that the interest of this investigation is not based on the final size of the child, but on the search for influences harmful to his mental development. A retardation in physical growth may be made up by a later acceleration, but the cause of that retardation, if allowed to go on, may lead to stunted mental development of greater or less seriousness. Bad conditions are most quickly indicated by departures from the normal rate of

growth. In general the degree of deviation, which is common and perhaps of no serious moment, is very slight, as indicated by Table D. When the child has inherited a smaller frame, but the rate of increase remains about normal, some variation from the average may be of little significance.

Two facts are worthy of attention: first, that the figures for boys and girls are quite different, especially at the age of adolescence; and secondly, that the variations from the average for each age are inconsiderable. This appears in Table D.

There seems to be evidence[1] also that there is a falling off in the nervous power of the child at about the seventh and eighth years. He is more easily fatigued. This is due probably to the fact that the increase in the size of the heart muscle does not correspond to the rapid increase in height and weight at that age.

[1] See Bryan in the *American Journal of Psychology*, Vol. V, page 123 ff.; and Gilbert in *Studies from the Yale Psychological Laboratory*, Vol. II, page 63 ff.

The growing season. — It is true that the physical growth of children is much more rapid during the summer than in the winter, the latter period suggesting the period of hibernation for animals. Spring and early summer include the time of increase in height; the latter part of the summer and the fall for growth in weight. The shooting-up and the filling-out season for vegetation correspond quite closely to man's periods of rapid growth.

Influence of sex on growth. — The normal growth is also affected by bad practices arising through the growing consciousness of sex. To this the boy especially is exposed. This hindrance to growth might have been treated under the head of injuries and disease, as it is a habit which may lead to both. It deserves, however, as long as we allow the present ignorance on the subject, a special place.

Results of a foolish modesty. — The ordinary forms of play, aside from the promptings of his own nature, tend to acquaint the boy with himself. Unless he has been previously warned in

a decided way of danger from that source, he may easily become addicted to habits from which a little fatherly or even motherly counsel would have shielded him. This counsel is, owing to a modest but imprudent shrinking from a manifest duty, usually given, if given at all, too late. It is the duty of the parent to lead the child to confide in him, to forestall his difficulties, and to make it not only possible but easy for the child to come to him. It is a standing shame and menace both to the health and morals of our American youth that the child is left to learn through debased and bad-minded associates that which should come from a pure and trusted source. In the meantime, through sheer ignorance, he is exposed to evil habits.[1]

Clark University in the East and Stanford University in the West have of late entered on a campaign for the study of sex and of sex hygiene. Not only has the general ignorance of boys on such matters, except as gained through their coarser playmates, been condemned, but it

[1] See bibliography, page 198.

has also been shown that a wide ignorance of the normal growth and development of sex exists even among adults. It has also become clear that a very large percentage of children have no readiness to confide in their parents on these matters. A large number of women have testified both to their ignorance of the meaning of the changes in their own lives, and even to their attempts to check the menstrual discharge, which they considered an abnormal condition. Similar testimony has come from men, showing that a lack of knowledge of normal sex phenomena and hygiene is very frequent. The common recourse, in lieu of the confidence in the parents, has been to quacks, who have made those who were perfectly normal in all their symptoms pay large sums for the cure of terrible maladies which existed only in the imagination. Mr. Lancaster, in a recent article, makes what is practically an exposure of their methods and their success. There are eight firms in this country which print advertisements intended to arouse in the uninstructed a morbid fear of sex disease. Symptoms which belong to

normal development are cited as indications of disease. The replies are pooled and sold to quacks. One broker told him that he had in stock 705,000 medical letters of this sort. The victims are hurt psychologically more than physically by such impositions. The mental tortures suffered for years by individuals of perfect health as a result of these misplaced confidences are striking evidence of the permanent warping and stunting of the mind resulting from our neglect to provide instruction in this direction.

Sex hygiene. — The Italian Dr. Marro, in a recent work on "Puberty," is right in saying that proper emphasis, in talking with the child, of the pain attending child-birth is sufficient to remove any tendency toward lascivious thought which the child might have otherwise. The two widely divergent ideas cannot live together. A serious scientific explanation must have a beneficial effect.

Dr. Marro insists on four points as of especial importance in sex hygiene, namely, good nutrition, physical exercise, proper clothing, and

healthy mental environment (Societa). He emphasizes in connection with these bathing and work. It seems hardly necessary to emphasize the importance of good nutrition and proper clothing in this country, though persistence in eating unwholesome foods, and lack of instruction as to what foods may be taken during the menstrual period, are quite general, and tight lacing is still practiced to a considerable degree. Vigorous exercise turns the new vital force into healthy channels and acts as a general tonic. There is an unhealthy tendency in our country for our youth to enjoy *seeing* instead of participating in athletics. The bicycle has done much toward giving both young men and women healthy physical exercise, and it is looked to by the Italians as one of the means of emancipating their women. But it is needless to say that the humpbacked candidate for spinal curvature should be discouraged.

The best mental environment for adolescents is a timely subject for consideration. Dr. Atkinson reports that in Springfield, Mass., the chil-

dren in the first year of the high school, fresh from the tutelage of the grammar schools, read much more wisely than the seniors, presumably because the latter read more of the current hit-or-miss literature and less of standard works. His figures corroborate a vague feeling pervading most high school teachers. Healthy associates, healthy books, and a healthy home are the essentials for a satisfactory mental environment of the adolescent.

Work or constant employment is one of the important features of sex hygiene. It takes the adolescent from himself, and tends to widen out his interests and ideals. It is strange that parents do not more generally see to it that their children are always interestedly employed.

In the same way bathing should be looked after. Specific directions and even supervision are desirable, until good habits have been formed.

One source of danger. — Little attempt has been made to secure for the girl some immunity, at least, from the pressure of school work at the monthly periods. There is abundant testimony

both from physicians and the sufferers themselves to the fact that the lack of consideration during these periods has brought a vast amount of ill.

The girl is naturally self-conscious. She is usually ambitious and unwilling to receive a low mark. Frequently a number of her teachers are men. These facts combine to lead the girl beyond her strength.

This problem should be met by teachers. Some provision must be made by which a whole or partial easing up of school work may be secured temporarily without embarrassment to the applicant. Where a physical instructress is employed, orders to the effect that Miss Blank should be excused for the time being from such and such work, might very properly emanate from her. Where there is no such teacher, some one of good judgment in sympathy with the students should be appointed for this especial duty.

Test questions from the standpoint of sex.— The most important questions from the standpoint of sex in the light of the preliminary dis-

cussion are: Has the child a normal, healthy knowledge of sex from a trusted source, or has he or she only the morbid, immoral suggestions of it derived from coarse playmates? Can he confide in his parents? Does he have the right physical environment for sex hygiene as represented by nutrition, physical exercise, bathing, and clothing? Does he read good books? Has he good associates?

Special cases. — Teachers as well as parents have been puzzled by children that are bright and active one day, stupid and immovable the next. Periodical attacks of stupidity, dark rings under the eyes, a desire to be alone, nervousness, inability to meet the teacher's eye, and especially a tendency to stay in bed in the morning without cause are symptoms of evil. None of them, however, carries proof of bad practices with it. In general, the teacher can only assert that something is wrong, and advise that a physician be consulted. A principal or parent can frequently, however, invite confidence and secure it to the very great benefit of the boy.

Books on sex. — In the bibliography of this chapter some reference has been made to books intended to bring this matter before boys and girls in a refined and helpful way. None but a strictly scientific treatment seems adequate or to be absolutely without offense, but the modesty and probable helpfulness of the books mentioned seem to be worthy of especial commendation.

Growth during adolescence. — Not only have parents been unwise in neglecting to teach the child of sex early enough, but we find both in parent and teacher a rather marked blindness to the real nature and far-reachingness of the changes of adolescence. Some of the more obvious of these, such as the change in organs, menstruation, the enlargement of the larynx, the elongation of the vocal cords, the growth of the beard, and the changes in form both in the boy and the girl, have all been noted, and the general thought has been, that with them the enumeration of the peculiarities of the adolescent period was completed. These changes appear so gradu-

ally during the decade given over to adolescence that those of far-reaching significance which attend them have almost entirely escaped notice. It is difficult to distinguish between the physical side of adolescence and the mental. As the physical has its chief meaning in the mental changes, those which are most evident and closest in their connection with the physical will be touched upon. A study of the figures already given will show that there is a marked difference in the growth of girls as compared with boys in the first part of the adolescent period. The girl begins to shoot up rapidly from the ages twelve to fourteen, usually surpassing the boy of the same age, while the boy's period of rapid growth is rather from fourteen to sixteen. Although it may not be fair to say that this has not been noticed, it may be said fairly that nothing has been done in the way of adapting our school conditions to this difference in growth. Some have gone so far as to claim that boys and girls should be taught in separate schools during the adolescent period. Whether

this be the wisest solution is open to question, but that different plans adapted to the varied needs and interests of each should be worked out is hardly to be doubted.

Sensitiveness. — Aside from our short-sightedness in this particular, we have failed also to note the increased energy and tendency to activity of the child during this period, the tendency to wander and even run away, the liking for solitude, the apparent irresponsibility, the tendency of heredity to assert itself strongly at this period. During adolescence, the heart increases in size. The arteries become nearly a third larger. The skin takes upon itself a greater sensibility, while the sense of sight, smell, and even the sense of taste are widened, either in the extensity or intensity of their sensitiveness. These changes combine with the more commonly recognized adolescent changes to make the child awkward and self-conscious. There is a lack of motor control which makes it easier to "fall over a chair than go around it." His self-consciousness shows itself in a desire for solitude, or in a readiness to

"show off" which has led to the designation of the first part of the period of puberty as the "smart age." The sternness of Clearchus and the primitive view of justice represented by revenge are quick to appeal to the child at this age, while great dignity of carriage, heavy pounding with the heel on the floor in walking, and a hundred other affectations express the new consciousness of self. President Stanley Hall says: "Adolescence is nature's last effort to be generic."

Intensity of adolescent life. — The increased blood supply has a more important function, however, than is shown in these results of physical change. The rapid building up of the physical puts the whole body on the *qui vive* for excitement. This tension should be relieved by activity in some direction which will contribute to both present and future happiness. The period of adolescence marks both the heights and the depths of the soul's strivings. It is the time when ambitions and ideals of widely divergent type force themselves upon the normal individual. Sixteen is the age of the largest number of con-

versions. At almost the same age the worst and largest number of crimes are committed. The lavish use made of his store of energy by the adolescent, and the consequent ebbing of vigor and relaxation of the physical self until recuperated, are also the causes of the fluctuation between activity and dullness, which is also a feature of this age of contrasts.

Effect upon the interests of the child. — The increased size of the heart and the calling into play of cerebral centers not before active must naturally enlarge the scope of the child's interests and awaken in him abundant tendencies to activity. Strong feelings now in this direction, now in quite another, are characteristic. A marked changeableness and reaching out in the direction of future ambitions and hopes are peculiar to this age. The lives of most prominent educational reformers show this changing but vigorous groping tendency to activity now physical, now mental, at one time practical, at another reflective. Reports of adolescents have testified to this dream life, a phase peculiar to adolescence.

The contrast between the real and the ideal life leads the child naturally to wish to work out from his own experience and make real without restraint the life of his dream. Hence arise the love of roaming, of truancy even, and the liking for solitude, — all these representative of the new life which has been excited in the child by the changes of his age. To this same cause is probably due the apparent irresponsibility of children at this age. It does not necessarily mean that the child is getting more careless or more depraved, but rather that a new and wide field of knowledge is the scene of his real interest and mental action. Consequently the old takes on less of importance in the light of this wider, newer, intenser life.

Needs of the girl. — The view of those who advocate for girls a training similar to that of boys, the same sports and forms of physical exercise, are hardly justified by the physiological changes coming at puberty. The development most perfect from the standpoint of maternity makes going upstairs especially diffi-

cult, and even likely to produce injury. Where very much of this sort of thing is required, an elevator is almost essential. The serious effects of fatigue and strain after puberty deserve more general recognition. The amount of physical exercise taken by the girl, on the other hand, may easily be too restricted. Considerable, though moderate, exercise should be the rule.

The tendency of some girls, through lack of ambition and ideals, to make themselves, or to be made, supernumeraries devoid of concrete duties, is serious. Aside from the ethical aspects of such an existence, its morbid egoism frequently leads to unhappiness, and eventually to disease. If we have an ideal no more pretentious than to make those immediately about us happier for our existence, it gives life meaning, and invigorates both mind and body.

Needs of the boy. — The boy should have a variety of directions for the expenditure of his energy. His enthusiasms in school and in college, his peculiar hobbies especially, are all worthy of our respect, no less than his ambi-

tions and restlessness. He feels the desire to "yell," to run, to throw off restraint, which betoken the growing man. The fatigue and strain which may prove so serious for the girl mean little to the boy. Far more dangerous is it for him to disobey the summons to activity, physical or mental, made upon him by nature.

Test questions. — Growth, though rapid, is at no time more easily arrested than at adolescence. The important questions are: Has the child educative and healthy activities to serve as safety-valves for his energy? Has he ambitions and ideals to which he may devote himself? Has he dangerous tendencies from which he must be saved by turning the direction of his action toward recreations or serious pursuits, which not only interest, but appeal to his higher nature?

CHAPTER XIII

SCHOOL CONDITIONS AFFECTING THE CHILD'S PHYSICAL NATURE

A summary. — A glance at the school and home conditions affecting the child's physical nature will serve two purposes. In the first place, it will give definiteness to the important practical points involved in the child's relations to these two highly influential factors in his environment, and again, it will summarize the chapters which have preceded. The Germans have written ponderous volumes on the subject of school hygiene, treating it in almost every possible phase. This chapter cannot expect to cover so large a territory, nor to give in detail all the advantages of each form of good conditions, or the disadvantages of each corresponding bad condition. It can, however, call attention to points frequently overlooked, sometimes easily remedied,

at other times fundamental. In this last class is the permanently bad environment due to the ignorance of those constructing school buildings or to the conservatism or economy of School Boards. In most instances it is not necessary to give in detail the reasons for insisting upon such arrangements as are here specified. To the ordinary reader they are obvious, but a statement of them may lead to a deeper realization of the degree to which good conditions are disregarded in the ordinary school building and room. The health record of children not attending school is much better than that of those attending. The seriousness of these violations of hygienic laws deserves wider recognition, and teachers or parents should be able to determine by tests the degree to which their children are subjected to injurious conditions.

Site. — The school building, whether in the city or country, should be on high ground, well drained. There should be no swamp, no standing water near. The street should be quiet. If the situation is necessarily in a busy section of

a town, the street should be asphalted in the vicinity of the school. No tall buildings should be near enough to affect the light of the schoolroom. Areas and like passages contributing to the light of the building should be painted white, so as to reflect as much of the light as possible. The *test* of the light is always the ability to read print at the normal distance. If the requirements of this test are not met in the darkest parts of the room even on cloudy days, work demanding much of the eyes should be suspended until the difficulty has been removed. It is evident that there should be no livery stable, brewery, or factory smells that can reach and vitiate the air of the schoolroom. The exact function of sunlight is not agreed upon by experts, but its influence seems to be decided. Whether its advantage be due to the freedom from dampness, or to some direct, purifying effect of the sunlight on the air, or to any other of a half-dozen alleged reasons, it is admitted that it is a factor in the healthfulness of school buildings.

Water. — In cities an analysis of drinking

water is usually made aside from the school. If a test seems to be needed for the school, dissolve a lump of loaf sugar in a bottle of water, and let it stand by the window twenty-four hours. If the water is not then clear, the supply from that source should not be used. In country schools there is danger in wells which have not been used during the vacation times. Wells should be emptied of the water which has been standing during the summer, and the usual precautions with regard to the position of the well relative to the out-buildings and other sources of pollution should be observed.

Heating and ventilation. — One of the best German authorities on school hygiene claims that the air in the ordinary schoolroom is already vitiated before the work of the school day has begun. In our own country of late great advances have been made in the use of fans, electric or steam, for forcing air through buildings. Schemes for forced ventilation have been combined very successfully with the use of hot air for heating, so that together they seem to be

the most economical, effective means of heating and ventilating school buildings. Where hot air and forced ventilation are used, care must be taken that the source of the pure air forced into the rooms is not vitiated. There must be no windows near, from which the impurities of closets or refuse might come, nor should the air be robbed of its moisture in heating. The water pans in the furnace must not be allowed to get dry.

The temperature should be from 65° to 70°. Americans usually keep their schoolrooms too warm. One German authority makes the proper heat for a schoolroom 50°. Teachers or children who cannot feel warm with the thermometer at 70° ought to wear warmer clothing. It is not right that a whole room should be discomfited by a temperature of 80° because a teacher and perhaps one or two of the children feel more comfortable with that degree of heat. It has a degenerating effect upon the whole class. Where there is a suspicion that the moisture of a room is lacking, or where there

seems to be an excess of moisture due to that exhaled by the children, an hygrometer should be used to determine the amount.

In general a student requires 250 cubic feet of air space with an allowance of 30 cubic feet of air each minute. For 40 pupils the dimensions of a room in feet should be about 25 by 30 by $13\frac{1}{2}$, and the air would have to be completely changed about seven times an hour, while the windows should be opened and the room flushed out once in that period. Where window ventilation is used (a dangerous measure when the mercury of the thermometer registers much below the freezing point), the air should come in through the top, and a board or sheet of metal be used to throw the air toward the center of the room so that it may be distributed more generally and freely. Any draughts, hot or cold, are to be avoided.

Where carbonic acid gas is present in a schoolroom to the extent of six parts to ten thousand of pure air, organic matter enough to poison the air is present. The effect on the children is drowsiness, stupidity, and fatigue. If an odor can be detected by one coming from out of

doors, the room is in need of ventilation. Or put a half-ounce of limewater in a pint bottle. Draw three very faint lines on a piece of paper. Note carefully how clearly these may be seen through the limewater. Using a bellows or bicycle pump, fill the bottle with the air of the schoolroom. Cork the bottle, shake it thoroughly, and let it stand three or four minutes. If on second trial with the lines they seem fainter or disappear, the impurity of the air is shown.

Great care should be taken to see that the cellar of the school is dry, and that it is stored with nothing that may decay. For a healthy cellar the use of boxes of unslaked lime to absorb moisture is desirable. The water-closets ought rather to be in a separate building than in the cellar of the school building, as the air is very likely to suffer when the closets are placed in the building itself. No better use of a cellar can be made than to equip it with baths and gymnastic apparatus, *if* it can be properly heated and ventilated.

No better indication of a well-ventilated and well-kept school building can be found than an absolute freedom from all odors. Wherever

odors are found, their sources should be discovered, and the causes removed, whether in the school yard or in the schoolroom or in the halls. Still more important is it that we know, when the smell is due to the diseased or neglected condition of one of the children. Dressing rooms should be ventilated by windows, and not by opening into the schoolroom. This last practice is particularly dangerous when wet clothes and umbrellas are placed in them.

Floors. — The floors of the schoolroom should be made of hard-wood boards, fitting very close. There should be no cracks in which dirt can settle. An analysis of some of the dirt taken from cracks in German schoolrooms disclosed the germs of something like twenty different diseases, comprising a list well calculated to inspire terror to the uninitiated. To avoid the possibility of germs of disease being stirred up with dust from the floor, it should be sprinkled with a little chopped straw dipped in a weak solution of chloride of lime, and swept once a day. This solution may be made by taking a

pound of chloride of lime for four or five gallons of water. This daily careful treatment cannot be substituted for by washing with a large amount of water once a month or week.

Furniture. — The following figures indicate by ages the distribution per thousand cases of a form of spinal curvature (scoliosis) as found in German children by Eulenberg.[1]

From	birth	to 2 years,	5 cases
From	2 years	to 3 years,	21 cases
From	3 years	to 4 years,	9 cases
From	4 years	to 5 years,	10 cases
From	5 years	to 6 years,	33 cases
From	6 years	to 7 years,	216 cases
From	7 years	to 10 years,	564 cases
From	10 years	to 14 years,	107 cases
From	14 years	to 20 years,	28 cases
From	20 years	to 30 years,	7 cases

It will thus be seen that 920 of the cases out of the thousand occur between the ages of five and fourteen, a tremendous evidence of the unhygienic treatment of the children by the school. To prevent such an array of disease a radical change has been demanded by physi-

[1] Cited by Baginsky in his "Handbuch der Schulhygiene," page 514.

cians. It should be possible to lower or raise the desks, the cover should slide down to meet the child as he writes, the seat should also be adjustable so that the feet will rest squarely on the floor.[1] Where a school cannot possibly be equipped with adjustable seats, three sizes of seats and desks should be found. No insistence of the teacher on correct position can atone for mal-adjustment of the seat and desk to the child. It would only result in greater fatigue and nervousness. Slate is the best kind of blackboard, though it is somewhat expensive.

Where maps are used, care should be taken that there be no large numbers of superfluous names printed upon them, thereby obliterating important lines and rendering the map useless, except at some near point. Where physical and political maps are combined, emphasis should rather be laid on the boundaries, which should be printed distinctly, and no attempt should be made to use color except for indicating physical features.

[1] Such a desk and seat have been described on pages 96 ff.

Light and sight. — The preservation of the eyes has received more attention of late, and modern school buildings show marked improvement over those built twenty-five years ago. It will suffice here to recapitulate the conditions which have been found best. Window space in a room of favorable proportions should be one-fourth or one-fifth of the floor space. Where it is very long and narrow, and the windows are at the end, more window space should be given. Where the windows are near the seats, less window space is necessary. The light should come in from the top of the window, and curtains should therefore be raised from the bottom or raised and lowered from the middle of the window. The walls should be white, or nearly so, in order to reflect as much light as possible. Where any considerable part of the room is covered by blackboard, and the light is hardly sufficient, a white or light-colored curtain should be drawn over the blackboard. This device will add more to the light of the room than is commonly imagined. Black-

board curtains will also be useful in covering exercises which the teacher does not wish the student to see until the appointed time. In most schoolrooms at least a third, and frequently a half, of the reflecting wall surface above the desks is covered by blackboard.

The window curtains should not be dark, but opaque. Where light may be gained from a window in a hall, opaque glass should again be used. Children should be guarded against facing bright light. Curtains raised from the bottom are also useful in cutting off dazzling reflections from snow or neighboring houses. The light should come in from the left. That from the front or right is very harmful. That admitted from high windows in the rear and from the left is the most perfect. An oblong room, lighted left and rear, eight rows deep and six rows wide, is very nearly ideal in this respect. The test of the proper amount of light is the ability to read type at a normal distance. If it can be read in good light and cannot be read in the light of the schoolroom,

efforts should be made to get more light. On dark days care should be taken to cut down the amount of work required of the child's eyes, unless artificial light can be used. Of the different forms of artificial light, electric is by all means the best, as it leaves no products of combustion in the room, and the air is therefore not vitiated.

Books should have type meeting the requirements of Pica already laid down.[1] The paper should be clean and good. Where certain books are held nearer the eyes than others, attention should be directed to their type and their degree of cleanliness. This last precaution is the more necessary in these days of *free* but *soiled* text-books.

It is necessary that every teacher note individual peculiarities belonging to the room in different lights and with different positions of the curtains, and that he also be alive to the individual peculiarities of the children. Records should be kept whenever there seems to be

[1] See page 13.

evidence of myopia (near-sightedness). This cannot be properly watched without tests.[1]

Hearing. — As already seen, children have frequently suffered great injustice as a result of defective hearing, which had been mistaken for listlessness or stupidity. Tests are again very necessary here, and the teacher should be aware of and alert to catch sight of the symptoms[2] of aural defect.

Disease[3] *and the schoolroom.* — The school has not only contributed largely to the number of cases of near-sightedness, spinal curvature, and more or less serious disorders of the nervous type, but by spreading contagious disease it has greatly added to the woes of childhood. Among the too lightly regarded means of preventing contagion are ventilation, careful sweeping and dusting, inspection of the cellar and water-supply, hygienic fountains with strainers, and the use of individual towels, either cloth or paper. In view of the marked decrease in the number of cases per outbreak

[1] See pages 14 ff. [2] See pages 26 and 31. [3] See pages 83 ff.

where contagious diseases are isolated, the following rules, adopted by the New Haven Board of Education, relating to contagious diseases, are worthy of special commendation and general acceptation: —

RULES OF THE BOARD OF EDUCATION RELATING TO CONTAGIOUS DISEASES

Section 138. They (the principals) shall see that the following rules of the Board of Education are observed: —

"No superintendent, principal, or teacher of any school, and no parent or guardian of any child attending school, shall knowingly permit a child sick with small-pox, scarlet fever, diphtheria, membraneous croup, or typhus fever, or any child residing in a house in which such disease shall exist, to attend any school without a permit from the Board of Health."

Any child who has been exposed to any one of the foregoing diseases shall not be permitted to return to school for at least two weeks after the last exposure, and then may return only upon a certificate of the Health Officer.

Any child, a member of a family in which, or living in the same house where one of the foregoing diseases exists, must receive a certificate from the Health Officer before returning to school.

Principals shall request parents of pupils who are affected by contagious disease, or who have been exposed to such disease, other than those named in the foregoing,

to withdraw them temporarily from school, and in case of refusal or neglect, shall suspend such pupil until the attending physician or Health Officer shall certify in writing that the danger of contagion is past.

Children may return to school in cases of scarlet fever after 49 days, diphtheria after 28 days, typhoid fever after 28 days from the appearance of the disease and then only upon the permit of the Board of Health.

Any child sick with the measles may return to school 14 days after the appearance of the disease.

Any child who has been exposed to the measles or lives in a house where the disease exists shall remain away from school 10 days after the appearance of the disease. However, when a child has been sick with measles or has been exposed to the same, or lives in a house where said disease exists, he may be admitted to school upon a physician's certificate stating that it will be safe to admit the child to school, whatever the number of days.

By resolution of the Board of Education, adopted March 27, 1896, the foregoing rules were made applicable to teachers and janitors.

It would be a splendid investment for the future health of any city to have a special officer to look after the health of children in the schools — call him, if you will, a school physician. His duty should be chiefly to prevent disease, but might include also the investigation of any cases re-

ferred to him by teachers in the schools. The records of the past need only to be consulted to show the desirability of having such an officer. Where a town is not large enough to warrant a special school physician, one of the regular physicians may be employed to do this work. He could probably be secured at a very reasonable rate, in view of the advertising that would be given him by this appointment. In many cities where there are medical schools or free dispensaries, teachers are ignorant of the fact, and children too poor to get necessary treatment are suffered to drift along and perhaps become incurable, when competent and free medical treatment could have been obtained had the teacher been aware of the fact. Not infrequently large-hearted specialists are willing to give their time to needy children vouched for by earnest teachers.

Schoolroom method. — The pupils in a certain city were recently referred to as well versed in the latest methods of worrying teachers. It is not impossible that in many a city a similar charge might

be made against the teacher with reference to the child. There are marks, examinations, restrictions as to position and occupation, the use of fine muscles in young children, the lack of recreation, punishments of various sorts, a real or seeming arbitrariness, nagging, and perhaps more serious, the over-pressure upon some children due to iron-clad system, and many others, all devices for worrying pupils. To be sure each has some special purpose and some specific advantages in individual cases. Some of them are forced upon us by public opinion. In this last class are included especially schemes for marking. There are few teachers who could not dispense with their marking system, and be equally just to the child, were the parents satisfied. The teacher knows from the work done, and not from the marks, whether Johnny or Jennie should be advanced or held. Marks give false standards. Perfection for one child is not perfection for another. The most important of all examination questions is this: Is the child doing his best? The present mark-

ing system current almost everywhere gives no answer to this question, and is ordinarily, moreover, no indication of the child's real effort in his work. It must be granted that marks constitute an easily understood indicator of general fitness to advance to a higher grade, and, as such, they offer a concrete goal to the child. But, as a measure and reward of endeavor, which, aside from our theorizing, they are to the child, marks are a serious failure.

Again, examinations are devices for worrying pupils, necessary under some conditions, and one of the special beauties of a school system. They should be reduced to the minimum, and are desirable simply as incentives to review and effort.

The mere subjection to school routine and discipline, and the alertness necessary for strict compliance, are sources of considerable worry and wear upon the child. Immediate obedience to successive bells and signals, restrictions to certain postures in the seat, to certain forms of occupation and even of play, do much to dwarf interest, to lead to a passivity which is

far removed from the active aim of the school-room. Freedom from all unnecessary restraint, and a study on the part of the teacher how best to secure the maximum activity commensurate, *not* with *order*, but with *effective teaching*, should be the teacher's aim.

The use of fine muscles, those of the fingers in the kindergarten and in the earlier grades through sewing and writing, are of known harm to the children. The kindergartens have largely dropped the use of fine needlework. But we still see children in the earlier grades using their fingers in writing where they should be using their arms, preferably on a blackboard. If a horizontal or sloping blackboard could be secured, this would have many advantages for the first writing.[1]

In the crush of modern studies into the school the time for recreation of the free-play sort has been cut down if not out. However, it has been shown scientifically to be economy in the learning

[1] See Hancock's "Preliminary Study of Motor Ability," in the *Pedagogical Seminary*, Vol. III, pages 9 ff.

power of the child to have a short period of recreation in the open air if possible after every protracted exercise or series of exercises. The figures furnish material for severe arraignment of no recess or indoor recess programmes. Where the teacher has the ability to concentrate and correlate this work truly, so as to give more evident unity to the subjects taught, he has done a splendid thing for the children. But should he be but a surface servant of the popular demand for correlation, it will be confusion worse confounded and an added source of worriment to the pupil.

Whatever forms of punishment are used, they must necessarily entail a certain amount of worry, but of a salutary rather than a harmful kind. It becomes harmful where the child begins to fear for his own freedom, and becomes discouraged. Punishment by keeping children after school should be reduced to the minimum because of the devitalized condition of the air.

One of the most potent modes of worrying children is least conscious of itself. It is the

teacher with a nervous manner. He is arbitrary, either really or apparently, and frequently very serious. This seriousness and this arbitrariness are imitated by the children, and produce a clashing of purposes, tending only to make the work more nerve-tiring for both teacher and children. Every teacher has days of this sort. In each case they tend to become more frequent; the teacher must not allow this weakness to become chronic.

All children cannot be treated exactly alike. This truth applies particularly to the period of adolescence. The treatment of individuals, and especially the treatment of girls as compared with the boys, must be varied according to the more rapid maturity of the former and to the personal peculiarities of each.

The school programme. — An investigation of the school curriculum and its effect upon the child's physical condition has led to a number of interesting, if not thoroughly conclusive, results. The longest period which a child of five to seven years should be expected to have for a given

exercise should not exceed fifteen minutes. For a child of seven to ten years it should not exceed twenty minutes; for a child from ten to twelve, not over twenty-five; and from twelve to sixteen, not more than thirty. These figures have been approved both by experiment and experience. They are maxima for all confining exercises. With regard to the exercises which are the most fatiguing, arithmetic and language, as may be generally supposed, have proved most so. But rather to the surprise of most teachers, careful experiments have ranked physical culture exercises with these subjects. In justice to physical culture, it should, however, be remembered that this is the case where it is continued for the same length of time as the other exercises, which rarely happens in this country. Still, the experiments show that gymnastics is not as restful as has been thought. One investigator, Kemsies, found the order, beginning with the most fatiguing, to be: gymnastics, mathematics, foreign languages, religion, mother tongue, natural history, geography, history, singing, and drawing. All

of these investigations are tentative and liable to error from numerous sources. The relative difficulty of subjects is best known to the teacher and the pupil, and varies much with individual teachers and students, depending upon the tastes and aptitudes of both. The interchange of the more and the less difficult studies is desirable. The fatiguing nature of physical culture is also a strong argument which should forbid the supplanting of a recess by such an exercise. Aside from the time for recess (and this should be under as little felt supervision as possible), there should be, when the hours are at all long, a lunch period, especially for the younger children.

As for the relative merits of a one-session, or two-session plan, much may be said on both sides. The consensus of opinion and recent experiments concerning the time of greatest fatigue, have seemed to indicate that the morning work should be given over rather to the more difficult subjects, while the afternoon may be devoted to one hard subject and recreation or study work.

There is little doubt that as much may be accomplished during the first school year in a three-hour session as in one of five hours. Data where it has been tried would seem to indicate that second and third year pupils will progress at a normal rate with no more than three hours and a half. The time spent above that is ordinarily lost through the strain, effort, and confinement involved in the usual school curriculum. This might not be the case, if we introduced more educative play, and more outdoor work, with the children in our five-hour session; but until then it will.

The school curriculum. — With regard to the ordinary subjects of the school curriculum, a few suggestions which may help the child physically are pertinent.

From the standpoint of psychology and physiology the value of reading, writing, and arithmetic has been questioned for children under ten years of age.[1] Manual exercise, natural science, and

[1] See Patrick's "Should Children under Ten Learn to Read and Write," in the *Popular Science Monthly*, Vol. LXIV, pages 382 ff.

history stories are certainly healthier, though they may not be so sound from the sociological standpoint.

The vertical writing is to be preferred. It is easier for the eye and the body. The amount of time spent in writing should be greatly reduced, if, as is the case not infrequently, one-fifth of a child's time is spent in some exercise involving this employment. Often much more than that amount of time is given to writing. Such a requirement is abnormal, uninteresting, and, worst of all, useless, unless it be to the teacher.

Hygiene should form an even more important subject in a curriculum than physiology. Many schools have forgotten that power and not knowledge alone was wanted from this study, and the hygiene element has been disappearing.

It is also apparent that the other subjects of the schoolroom have suffered from our insistence upon knowledge rather than feeling or expression. Even now, in reading or in literature, few teachers have learned that it is to *enjoy* good literature, which is the real aim, and not to

know all about when and where it was written, and the precise nature of allusions made. Unless the children feel nobler and learn to find in literature the source of their nobler feeling, no permanent advantage from most of the reading work has resulted.

In history, again, it is not merely to know exact dates, facts, and figures, but rather to inspire the children, to create in them ideals, to give them not merely a wider knowledge, but wider feeling, wider sympathy. The teaching profession is suffering from the feeling that in history and kindred subjects we must necessarily read and study as a text-book some dry but absolutely accurate treatise, rather than a fascinating and inspiring work like Macaulay's "History of England." The teacher can only blame himself if the child who has been worried into dry facts and figures, dimly understood, tires quickly of his reading and his history. Moreover, this worry means nerve waste.

In grammar and arithmetic the emphasis is put rather on the knowledge of correct forms

and methods than the accurate use of them. Here, again, we must introduce the expression, the using, the *doing* elements. In the case of grammar, it is perhaps questionable whether as a technical study it should not be relegated from the grammar-school curriculum altogether. The Committee of Ten wisely reduced it to the last year in the school curriculum, but such have been the requirements in grammar on state and college examination papers, that comparatively little progress has been made toward reducing the amount in actual practice.

The introduction of nature study and manual training work has done much toward enlisting the activities and interests of children.

Where drawing is made subservient to expression rather than the study of form, it is one of the healthiest and most recuperative of school exercises.

The growing tendency to introduce current news into the schoolroom in connection with geography or history will tend further to give life to the school course. These new features

point to increased health and decreased worry in the future.

In the teaching of music we have frequently blinded ourselves to the fact that we were harming voices which were changing, and have led children to *strain* for notes which they should have grown toward. The hygiene of the voice deserves more study, especially by teachers in the higher grades.

We should limit our demands upon the voice to the range of the children. They must be warned against shrill screaming. Especial care should be taken with the boy from the ages fourteen to sixteen, and with the girl of twelve or thirteen years. During this period there should be no systematic cultivation of the voice; and children at school should be excused from participating in elocutionary and other sustained vocal exercises without any detriment to their class standing.

CHAPTER XIV

HOME CONDITIONS AFFECTING THE CHILD'S PHYSICAL NATURE

Hygiene from the teacher's standpoint. — Almost everything in the previous chapter has an equal applicability in this one. The school stimulates to mental endeavor, and is more or less repressive of physical change. The home, however, is free both from this stimulation and this repression. The child's own individuality acts out itself, and not the average individuality. With this difference in mind the parallelisms between school and home conditions are evident.

There are, however, certain additional points of study which need be mentioned, if the child's home environment is to be investigated as far as it may affect his physical nature. The whole question of food, clothing, bathing, exercise, or recreation belongs to this side of the

investigation, while important supplementary aids in studying the nervous system, as employed at school, will be furnished by the parent. This chapter is written, it will be remembered, from the teacher's standpoint. Practically, everything in it has been suggested by the direct experience of teachers. New life to many a child will follow an investigation of home conditions tactfully followed up. The most probable outcome for the teacher, otherwise, would be the deeper realization of the ignorance of parents of some of the fundamental principles of hygiene. Rare, indeed, is the household that is not remiss at some important point of hygiene; probably as rare as the ideal schoolroom. A second general result would be the greater appreciation of the advisability of having a school physician who could properly investigate cases where the symptoms, pallor, nervousness, indigestion, and any others, point to unfavorable conditions.

Important questions. — The following questions are of prime importance for the home. A negative answer to any of them implies con-

ditions certain to *weaken* the child, no matter what our theories of hardening or toughening him may be. The questions are, of course, supplementary to those already proposed for the school, and must not be considered complete without them.

Food

1. Is the food eaten by the child simple?
2. Is it varied?
3. Is it well cooked?
4. Is it eaten slowly?
5. Is it thoroughly masticated?
6. Is it easily digested?
7. Is it eaten at regular times?
8. Where lunches are used, are they simple and nourishing, first of all?

Clothing and care of the skin

9. Is the underclothing changed at least once a week?
10. Does the child wear woolen next to the skin from early autumn to the late spring?
11. Does he change the underclothing at night?

12. Does he wear an overcoat or other heavy wrap even when the cold is not extreme?
13. Are the *chest*, *neck*, and *legs* protected with wool except in summer?
14. Does he or she depend upon the shoulders rather than the waist for the support of clothing?
15. Do his parents see to it that he changes or dries his shoes when he gets his feet wet?
16. Does he bathe all over at least twice a week?
17. Does he bathe in water neither too warm nor too cold?

Air

18. Does the child always breathe through the nose?
19. Is there anything but accidental provision for fresh air in sleeping and living room?
20. Are the furniture and floors kept clean and free from dust?
21. Is the plumbing often inspected?
22. Is the cellar dry both in summer and winter?

Exercise

23. Is he allowed to go out bundled up in cold weather, and not kept in for fear of taking cold?
24. Does he come in before he gets chilled?
25. How much time does he spend in exercise?
26. How much of it is in free play?
27. How much of it is out of doors?

Sleep

A child from six to eight years old should get eleven or twelve hours of sleep. A child from nine to eleven years old should get ten or eleven hours of sleep. A child from twelve to fourteen years should get nine or ten hours of sleep.

28. Does he get that amount?
29. Does he sleep free from draughts?
30. Does he sleep with access to fresh air?
31. Does he sleep where it is only moderately cold?
32. Does he sleep where it is cool enough?
33. Does he eat only food easily digested before going to bed?

34. Does he go to bed free from mental excitement or anxiety?

Miscellaneous

35. Has he the habit of regularly evacuating the bowels at a stated time?
36. Is he generally strong enough to do the work of the school easily?
37. If he has days when he is not strong enough, are they rare?
38. Is he free from any noticeable hereditary or early acquired physical weakness?
39. Does he refrain from the use of tobacco?
40. Does he always secure the best possible light when reading?
41. Is he careful never to read lying on the floor, couch, or by the firelight or twilight or with his book shaded?
42. Is almost all of his reading in books with good clear print?
43. Does he carefully avoid facing a lamp or other bright light while reading or talking?

44. Are his ears kept free from accumulations of wax by almost daily washing?
45. After attacks of measles, scarlet fever, catarrh, has he escaped without suffering from discharge of the ear or from noticeable deafness?
46. Is he encouraged to quickness and accuracy of movement at home in any positive way?
47. Are games of various sorts played at home?
48. Does he always hear carefully enunciated English at home?
49. Is any attempt made to help the child to correctness in his English?
50. Is the child free from all sorts of worry outside of school?
51. Is he kept from too frequent emotional excitement of all sorts, theaters, parties, etc.?
52. Does he sleep dreamlessly?
53. Does he rarely get over fatigued?
54. At home does he stand straight and take good postures when sitting?
55. Is he careful to walk erect and quickly with springy gait?

Importance and use of questions. — The possible scope of this chapter is as wide as hygiene. To bring it within reasonable bounds considerable knowledge of hygiene is presupposed. An attempt has, however, been made to throw each of the questions into the form of a hygienic principle, so that "yes" in answer to each would imply perfect hygienic conditions as far as these questions reach, and it is thought that they cover the chief points of hygiene. It is certain that they include knowledge and a means of testing which are sadly needed, if the experience of teachers is to count for anything. It is not expected that a teacher or supervisor shall write out a list or a copy of these questions and submit it to a given parent. No teacher has the time for that. One of two choices must be made: either superintendents must provide teachers with blanks containing important questions of this sort (and it is hoped that these will furnish a suggestive guide in his choice), or teachers will have to secure an interview with the parents and ask the questions orally

of them, noting those to which the answer, "no," is received.

Of course, a nice tact must be shown in submitting questions of the sort suggested in this chapter and in following them up. Any circular sent out should bear a statement to the effect that the teacher is studying the needs of a certain child, because he feels that there is something in its surroundings which interferes with progress. It will certainly be to the great advantage of the child if this obstruction can be found and removed.

It is to be borne in mind that these questions are not to be submitted to the parents of each child in the school or room. That course, though it might prove educative to the parents, would dissipate the teacher's energy.

The object of the investigation is to enable the teacher to know all of the conditions where the children are really suffering from neglect, and from his knowledge to be able to suggest means of righting the wrong. This is only another instance of the tendency of child-study,

namely, to focus upon individuals rather than take in vaguely the rank and file who are getting on very well under the conditions which exist. And perhaps no lesson is needed more at the present time than this lesson of the grandeur of and the individuality of the individual. It should be noted too that the instant one of these dragging individuals is set right, an astonishing impetus is given the many in the schoolroom.

Exceptional cases. — Some children defy the laws of hygiene with comparative impunity, though the immunity from disaster is in the eyes of the ignorant rather than those of the physician. Other children less hardy speedily show the results of such violations of nature's laws. The persistence with which the popular mind clings to certain whims, such as the hardening of the boy to the cold or to certain kinds of food, is an illustration of this. To be sure, plenty of examples may be shown of persons who have survived that treatment, just as long-lived victims of alcoholism, of the morphine habit, or of other generally recognized poisonous

conditions, are also to be found. It is the physician who can point to the other side and acquaint one with the suffering and losses coming from exposure of all sorts. It is perhaps worth adding that, owing to superior medical skill, from ten to twenty per cent more of the children born reach school age than did so in the days of our great-grandfathers. This means that, while almost the same number of children of very vigorous or even of average vitality are born, a large number are reared who could never expose themselves to ordinary hardships or breaches of hygienic laws without serious results.

Remarks. — A few remarks on some of the questions will not be amiss. Though, perhaps, not necessary for the test questions, they may still be of value to the teacher in talking with the parents.

Dr. Rankin is authority for the statement that the strength of the body at maturity varies as the proper amount of guidance and attention to the laws of hygiene.

The questions asked under the head of food

are *all* of them essential. It will not do to conform with the majority of them only. The same might be said with almost equal truth of those under the other headings.

The care of the skin takes on a special significance when it is known that from one to two and a half pints of effete matter pass through the skin every twenty-four hours. Any exposure to cold or lack of sufficient protection prevents this process, throws a strain upon the kidneys, and is liable to derange the digestive organs. A failure to bathe and to change clothing has a similar effect. The lack of an overcoat is a prolific cause of catarrhal trouble, pallor of countenance, and lack of fat. Many cases are on record, especially of young children, where a child healthy enough in the summer is brought to a physician's office in the late autumn, because of some serious loss of health. The child has been found to be wearing practically the same clothing worn in summer, and the provision of clothes suitable to the season has resulted in almost immediate recovery.

When mouth breathing takes place it is caused either by disease or by habit. Indian mothers frequently force the child to breathe through the nose by closing the mouth with their fingers until the habit of nose breathing is developed.

Dr. Rankin is also authority for the statement that "the only way to harden a child — by which is meant rendering him less susceptible to the effect of cold, and giving him strength and vigor of body — is by rigid adherence to the laws of health; that is, by providing a sufficient amount of clothing, plenty of outdoor exercise, pure air to breathe, simple and good food, with ample amount of sleep."[1]

It is estimated that the heart rests between beats a quarter of the time, and the lungs at the end of inspiration and expiration a third of the time. The only rest possible for certain parts of the brain is through sleep.

[1] F. M. Rankin, M. D., "Hygiene of Childhood," an excellent book. See bibliography, page 200.

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In the main, the order under each heading has been determined by the relative importance of the references.

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[1] See page 199.

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